OPERATING PROCEDURES

Columbia Basin Water Quality Monitoring Project

Slocan River

Burton River, Arrow Lakes

Poplar Creek, Lardeau

Horse Creek, Golden

Windermere Creek, Invermere

Salmo River

Joseph Creek, Cranbrook

St. Mary River, Kimberley

Jim and Laura Duncan, Coordinators
March, 2012

COLUMBIA BASIN TRUST
a legacy for the people

Acknowledgements

The Columbia Basin Trust Water Initiatives Program has funded the Columbia Basin Water Quality Monitoring Project since 2007. Without the support of Kindy Gosal (CBT Director Water and Environment), Heather Mitchell, Manager, Water Initiatives and the Water Initiatives Program Advisory Committee this program would not exist.

In addition, a number of people have contributed much time and energy in providing technical assistance to the project:

- Stephanie Strachan — Environment Canada
- Dr. Hans Schreier — University of British Columbia
- Dr. Sandra Brown — University of British Columbia
- Dr. Martin Carver — Consulting Hydrologist
- Dr. Ken Hall — University of British Columbia
- Ayisha Yeow — Environment Canada
- Tracey Henderson — Ministry of Environment
- Dr. Brendan Wilson — Selkirk College
- Joleen Raggett — Ministry of Environment

Contact Information

Jim and Laura Duncan have coordinated the Water Quality Monitoring Project since its inception. They can be reached at (250) 427-2600 or at

Laura gardenlaura@shaw.ca or Jim jim.duncan9@me.com

The Water Quality Monitoring Project is part of the Columbia Basin Watershed Network.

The Columbia Basin Watershed Network Database is located at: www.cbwn.ca

For further information about the Network contact:

Karen Nickurak
(250) 341-5914 or
cbwatersheds@gmail.com

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OVERVIEW

The Columbia Basin Water Quality Monitoring Project (CBWQM) is a project of the Columbia Basin Watershed Network (CBWN), which is a project of the Columbia Basin Trust. At a meeting in Kimberley in September 2006, the members of the CBWN decided that a priority of many of the groups was long-term water quality monitoring. Through much discussion, it was decided to adopt the Canadian Aquatic Bio-monitoring Network (CABIN) protocols, with some additions. The following goals were also adopted:

- To develop a model for long-term community-based water quality monitoring
- To establish accessibility to the water quality data through web technology
- Provide water quality data to Basin residents in a user-friendly format

The project includes:

- CABIN monitoring – once a year at 3 sites
- CABIN data entry to CABIN database
- Additional monthly water chemistry – once a month at one site
- Sending monthly field chemistry data to project coordinator
- Continuous temperature monitoring – temperature loggers placed at 3 sites
- Web-based database temperature data
- Interpretation of the data

Participating groups:

- Arrow Lake Environmental Stewardship Society (Caribou Cr, Burton Cr, Snow Cr)
- Friends of the Lardeau River (Lardeau River, Poplar Creek)
- Mainstreams Environmental Society (Joseph Creek, Cranbrook)
- St. Mary Valley Rural Residents' Association (St. Mary River)
- Wildsight Invermere (Windermere Creek)
- Wildsight Golden (Horse Creek, Ventego Creek)
- Salmo Watershed Streamkeepers Society (Salmo River)
- Slocan Streamkeepers Society (Slocan River, Goose Creek, Wilson Creek)

CABIN

The CABIN protocol is based on measuring a number of physical, chemical and biological parameters and then comparing the macro-invertebrate population in a given stream to the macro-invertebrate population found in reference or pristine streams of the same category of stream. For more information on CABIN, please go to (http://ec.gc.ca/rcba-cabin/default.asp?lang=En&n=72AD8D96-1)

Each group in the CBWQM Project monitors 3 sites. Once a year in the fall, the participating groups carry out a full CABIN monitoring at each of the 3 sites. The full CABIN involves the following:

Physical parameters:

- Air temperature
- Water temperature
- Stream width
- Stream depth
- Stream velocity
- Slope of stream
- Size of substrate

Chemical parameters:

- pH
- Dissolved oxygen
- Conductivity
- Turbidity
- Alkalinity
- Orthophosphate
- Nitrite/nitrate
- Metals scan at one site once a year

Biological parameters:

- Riparian vegetation
- Canopy cover
- Habitat type
- Presence of algae in stream channel
- Aquatic macro-invertebrates

The data from the field sessions is entered into the CABIN web site (www.cbwn.ca/database.php)

Additional factors

The CBWQM Project augments the core CABIN parameters with continuous temperature monitoring and additional water chemistry once a month at one of the sites.

Structure

The project is funded by CBT and driven by the member groups with input from the CBT and with advice from:

- Stephanie Strachan (Environment Canada, Vancouver BC)
- Dr. Hans Schreier (University of BC)
- Dr. Martin Carver (Consulting Hydrologist, Nelson BC)
- Dr. Sandra Brown (professor at UBC)

Training for the CABIN protocol is provided by on-line courses accompanied by a 2-day field session provided by Environment Canada.

The project is in its 5th year as a pilot project so aspects of the project are being reviewed and fine-tuned as the work carries on. For instance, two years ago, conductivity and turbidity meters were purchased for each of the groups and some changes were made to the monthly chemical parameters. The project is considering adding Flow to the list of monitoring parameters.

Equipment

Member groups have been provided with the supplies needed to carry out the monitoring, including:

Macro-Invertebrate sampling

- Macro Kick Net
- Stopwatch
- Tweezers
- Squeeze bottle
- Macro Sample jars
- Labels, waterproof paper
- Ethanol (2L)
- Bucket

Habitat measurement

- Meter stick
- Ruler
- Measuring tape
- Thermometer
- Hobo loggers with computer shuttle and software
- Logger anchors & rope

Water chemistry

- WQ sample bottle (from Maxxam)
- Labels
- Cooler (from Maxxam)
- Ice pack (from Maxxam)
- Maxxam COC (from Maxxam)
- pH meter and solutions
- Dissolved Oxygen Hach kit

Miscellaneous

- Zip-loc bags
- Pliers
- Scissors
- Cutting knife
- Multi-screwdriver
- Duct tape
- Felt pen
- Pencil/pen
- Clipboard
- Plastic bags
- Carrying case

Responsibilities of the Groups

- Waders & boots
- Personal Flotation Device
- Camera
- Topographic maps
- GPS (opt)
- Clinometer (opt)
- CABIN Manual
- CABIN field forms
- Laptop to download loggers (opt)
- Spare clothing, shoes
- Spare rope (opt)
- Hat, sunscreen
- Foul weather clothing
- First aid kit
- Tailboard:
    - Cell phone/sat phone
    - Contact person
    - Emergency numbers
    - Location description

Responsibilities of the participating groups

- Take the CABIN training (paid for by the project) – Estimated time required: Module 1, Introduction to CABIN and Biomonitoring (3-6 hours), Module 2, Field Sample Standard CABIN Protocol (3-6 hours), Data Entry (2-3 hours), Field Certification (18 hours over 2 days)
- Do the CABIN sampling once a year at the 3 sites chosen by your group – time required: approximately 0.5 day per site
- Do the monthly sampling at one of the sites – time required: approximately 1 hour plus travel time to site and shipper
- Prepare and install continuous temperature loggers at 3 sites, install/retrieve – time required: approximately 2 hours per site
- Enter the data into the Environment Canada CABIN database – time required: approximately 2 hours per site
- Complete Field Data Report Form for the CBWQM database and send it to Project Coordinators – time required: approximately 1 hour per month
- Reporting monthly field chemistry to coordinator – time required: approximately 0.25 hour per month
- Try to meet the objectives of the project
- Be full participants in the CBWQM network, including attending Steering Committee meetings/phone conferences, sharing of data and providing input to the current operations and the future of the project

Resources available to the groups:

- Equipment needed to carry out the project has been provided (with the exception of the items listed above)
- All lab costs and shipping costs are covered
- The opportunity to take the training with costs covered
- Advice from professional advisors

MONTHLY WATER CHEMISTRY MONITORING

Each group does water chemistry sampling at one of their three sites once a month. This includes taking a water sample for shipping to Maxxam labs in Burnaby. The parameters the lab analyzes for are: Alkalinity, Nitrite/Nitrate and Orthophosphate. Because some of these parameters are time sensitive, the samples must be sent via courier the same day (early in the week, so as to avoid weekends) so that the samples reach the lab within 48 hours.

It is very important that the Chain of Custody forms and the sample labels are filled out correctly so that the correct analysis is carried out and assigned to the correct site. Instructions follow on Page 9 and 10.

The monthly sampling also includes parameters that are measured using field equipment owned by the project and includes Dissolved Oxygen, pH, turbidity and Specific Conductivity. The procedures associated with the field equipment follows on Pages 11-16.

Monthly Monitoring Field Checklist

EQUIPMENT	DATES					
Field Forms						
Sample Bottles, labeled						
Cooler (Maxxam)						
Ice Pack						
Maxxam COC						
Thermometer						
Waders/Boots						
Waterproof Gloves Insulated						
pH Meter (Calibrated)						
pH Meter Spare Batteries						
pH Meter Manual						
Turbidity Meter (Calibrated)						
Turbidity Meter manual						
Conductivity Meter						
Conductivity Meter manual						
Spare Batteries (Turbidity/Conductivity)						
DO Hach Kit						
DO Hach Kit instructions						
Clipboard						
Felt Pen						
Pencil/pen						
First Aid Kit						
Spare Rain/Cold Weather Clothes						
PFD (Life Jacket)						
Throw Bag						
Safety Rope						
Cell Phone						
Shoes, regular						
Camera						
Garbage Bag						
Tape (securing cooler)						
Location Description						
Cutting Knife - Scissors						
Multi-screwdriver						
Duct Tape						
Topo Map or GPS						
Tailboard (emergency numbers)						

SITE CODE PROTOCOL

Each sampling site in the project is assigned a unique code. The project has chosen to follow a system used by Environment Canada and Water Survey Canada. The code consists of 5 letters and two numbers. The first two letters describe a Water Survey Canada sub-basin, the next three letters describe the creek the site is on and the last two numbers describe the specific site on that creek. Thus, for example, Horse Creek is in sub-basin NA, Horse Creek is represented by HOR and the lower site on Horse Creek is 01. The site code then becomes NAHOR01. The other site on Horse Cr then becomes NAHOR02. At this point in time, the site codes used in the project are as follows:

Group	**Stream/River**	**Site Code**
Arrow Lk Environmental Stewardship Soc	Burton Cr	NEBUR01
	Caribou Cr	NECAR01
	Snow Cr	NESNO01
Friends of Lardeau R	Lardeau River	NHLAR01
		NHLAR02
	Poplar Cr	NHPOP01
Mainstreams	Joseph Cr	NGJOS01
		NGJOS02
		NGJOS03
St. Mary Rural Residents Association	St. Mary R	NGSTM01
		NGSTM02
		NGSTM03
Salmo Streamkeepers Society	Salmo R	NESLM01
		NESLM02
		NESLM03
Slocan Streamkeepers	Slocan R	NJSLO01
	Goose Cr	NJGOS01
	Wilson Cr	NJWIL01
Wildisght Golden	Horse Cr	NAHOR01
		NAHOR02
	Ventego Cr	NAVEN01
Wildsight Invermere	Windermere Cr	NAWIN01
		NAWIN03
		NAWIN04

OBTAINING MAPS

Maps of watersheds in the project are very useful as a tool to gain more information about the watershed. They are also useful in determining the Stream Order of the project streams. The information about the watersheds received from the Ministry of Environment include a measure of Stream Order for the project sites, however, MoE determines stream order on a 1:20,000 scale while Environment Canada determines stream order on a 1:50,000 scale. (Environment Canada uses 1:50,000 maps because this scale is available across the entire country, while 1:20,000 maps are not available everywhere.) Topographic maps at a 1:50,000 scale used to be available through BC Access centres but are now being produced by third parties.

To obtain maps for your area of interest,:

- Go to http://maps.nrcan.gc.ca/distribution_e.php which opens to the 'Canada Map Office'
- Click on 'Through Certified Map Printer'
- Click on 'certified map printers' where you will find a list of dealers to order from. Each of them has a different system on their sites but you'll want to find the Canadian Topographic Maps (NTS System) in a 1:50,000 scale. Each company has an index to help you find the correct map for your area of interest but each index is unique. So far, I've found the one s on Go Trekker and Federal Maps to be the most useful.
- Most companies carry paper, water-resistant or laminated versions of the maps.
- Prices vary but generally range from $12 - $17
- Go Trekker maps are sometimes found in shops such as outdoor gear or book shops. There may be a store near you carrying the maps appropriate to your sites.

MAXXAM COC (Chain of Custody) for MONTHLY MONITORING

A Maxxam Chain of Custody (COC) form accompanies each of the coolers sent to member groups and must be filled out to accompany the samples which are sent back to the lab for analysis. The COC is important because it tells Maxxam who the work is being done for, what work is being ordered, how many samples are in the order and who to send the data to. It also tells Maxxam when the samples were taken and who has handled the material. Since some of the parameters we are interested in are time sensitive, it is important to know when the sample was taken. The COC also gives us a record of the analyses we have ordered and any notes of interest placed in the comments column.

Filling the COC out correctly ensures that the correct analyses are done and that the data is designated to the correct site.

Filling out the COC:

The COC comes with some of the basic information already completed. Along the top section, the Invoice Information and Report Information are already filled out. This tells Maxxam who pays for the work and where to send the data. In the Project Information section the Quotation # and Project # are filled out but the other lines need to be filled out. An example of a completed Maxxam COC Monthly Monitoring Form can be found at **Page 1–Appendix**. Please complete the section in the following manner:

Column Name	Entry
P.O. #	Leave blank
Project Name	Enter name of creek (e.g. Slocan R)
Site #	Enter site code where sample taken (e.g. NJSLO01)
Sampled by	Enter name of person taking samples
Regulatory Criteria	Leave blank
Special Instructions	Leave blank
Turnaround Time Required (TAT)	Leave blank

In the middle section, Maxxam will have filled out the parameters to be analyzed but the rest of the information will need to be completed by the sampler. In order to receive the results, please enter 'cc: email of person to receive data' in the Comments section. Please complete this section of the form as follows:

Column Name	Entry
Sample Barcode	Leave blank
Sample (Location) Identification	Enter site code where sample taken (e.g. NJSLO01)
Date Sampled	Date sample taken
Time Sampled	Time sample taken, include am/pm and time zone
Matrix	Enter H2O
Metals Field Filtered	Enter N
Alk, NO2, NO3, Orthophosphate	Enter check mark or x
# Of Bottles	Enter 1
Comments	Enter comments on weather, conditions on site, activities, temperature Enter cc: email of person to receive data (e.g. cc: passlab@xplornet.com)

It is important to fill in the bottom section as this provides information on how the sample (cooler) is handled and when it reaches different locations. Please complete this section as follows:

Column	Entry
Relinquished by (Signature/Print)	Enter name of person leaving cooler at courier, both signature and printed for legibility
Date (YY/MM/DD)	Enter date including year/month/day
Time	Enter time cooler given to courier, include am/pm and time zone
Received by (Signature/Print)	Enter name of person at courier company (or name of company), signature and print for legibility
Date (YY/MM/DD)	Enter date courier received the cooler, including year/month/day
Time	Enter time courier received the cooler, include am/pm and time zone
# Jars Used and Not Submitted	Normally enter 0
Time Sensitive	Check box
Laboratory Use Only	Leave blank

Once completed, including the signature of the courier, place the white copy in the provided zip-loc bag and place in cooler to accompany the sample to Maxxam. Keep the yellow copy for your records.

LABELING MONTHLY MONITORING SAMPLE JARS

Each month one water sample jar comes from the lab and must be labeled correctly in order to receive the appropriate analysis. This sample is accompanied by a Maxxam COC form, placed into a cooler with an ice-pack and sent to the Maxxam lab right away via courier so that he sample arrives in Burnaby within 48 hours.

Label the jar as follows:

*** An example of a completed label can be found in the Appendix, Page 2

Column name	Entry
Sample I.D.	Site Code Sample 1 Regular (e.g. NAWIN03)
Company Name	Your group name (e.g. Wildsight Invermere)
Project Ref:	CBWQM
Analysis	Alkalinity, NO2/NO3, Orthophosphate
Preservative	n/a
Contaminant Level	Low
Date	Date sample taken
Time	Time sample taken, include am or pm and time zone (e.g. 12:30pm MST)

FIELD METER READINGS

In addition to taking a water sample for lab analysis, each CBWQMP group takes water quality measurements with the project field equipment. This includes Dissolved Oxygen, Specific Conductivity, pH, Turbidity and Temperature. Please remember to have extra batteries for the meters and to calibrate the pH probe and the Turbidity meter before going to the field.

A manual explaining how the equipment is operated and maintained accompanies each piece of field equipment. These manuals should be carefully read before use and the correct procedures followed during readings. The manuals should be taken into the field when readings are being taken and carried in a zip-lock bag to protect from wet. If necessary, the manuals can be downloaded from online at the following sites:

Hach Dissolved Oxygen kit	http://www.hach.com/dissolved-oxygen-test-kit-model-ox-2p/product-downloads?id=7640219538
Hach 2100QTurbidimeter	http://www.hach.com/2100q-portable-turbidimeter/product-downloads?id=7640450963
YSI 30 Salinity, Conductivity and Temperature Meter	http://www.ysi.com/media/pdfs/030136-YSI-Model-30-Operations-Manual-RevE.pdf
Oakton pH Testr 30	http://www.4oakton.com/Manuals/pHORPIon/pHTestr3_3+mnl.pdf

The readings taken with the field meters should be recorded on the Field Meter Readings Form (shown below) and kept for your records. The readings should then be transferred to the Meter Readings Report Form and sent each month to the coordinator at **gardenlaura@shaw.ca**

Field Meter Readings Form

CBWQM Field Form (Conductivity, Turbidity, Temperature, pH, DO)

Site Code								**Date**					2	0	1	0
								Day			Month		Year			
Stream Name								**Time**			:					
								Hour				Minute		Time Zone		
Sampler Name																
Dissolved Oxygen				mg/l				**Type of Equipment**	*Hach DO titration kit*							
Specific Conductance				.		µS/cm		**Type of Equipment**	*YSI 30 conductivity meter*							
pH			.					**Type of Equipment**	*Oakton pH30 testr*							
Turbidity			.		NTU			**Type of Equipment**	*Hach 2100Q-01 Turbidimeter*							
Water Temperature +/-				.		°C		**Air Temperature +/-**					.		°C	
Weather:																
Other comments:																

Field Meter Reporting Form

Metre Readings Report Form

	Sampling Date mm/dd/yy	Site Code	Diss Oxygen	Specific Conductivity	pH	Turbidity	Water Temperature	Air Temperature
Units			mg/L	uS/cm	ph units	NTU	°C	°C

MEASURING DISSOLVED OXYGEN

The directions that come with the Hach Dissolved Oxygen Model OX-2P Model 1469-00 clearly explain the procedure for determining dissolved oxygen (DO). It is important to ascertain that the reagents included in this kit are within the Expiry Date. The project coordinator will inquire if re-agents are either depleted or near to being out-of-date and re-order necessary supplies once a year.

Following the DO procedure can be very difficult in cold weather. To prevent the stopper becoming frozen to the jar, frequently turn the stopper in the neck of the jar. If it is very cold and the sample begins to freeze, try to warm the sample by holding the jar inside a jacket during the waiting times in the process. If it is very cold, it may not be possible to do a DO reading.

With the yellow colour created during the Hach Dissolved Oxygen kit procedure it can be difficult to determine when the solution turns clear, thus making it difficult to determine the concentration of Oxygen in the sample. Adding a starch solution to the sample turns the sample blue, which can make it easier to determine when the sample turns clear.

Make up a starch solution as follows:
Add 2 grams soluble starch (corn starch works but note that it is not instantly soluble) to 100ml water - Heat to dissolve and add 0.2g salicylic acid (aspirin) as a preservative

Procedure:
Follow the instructions with the Hach kit. After adding the Dissolved Oxygen-3 pillow the sample will turn yellow if oxygen is present. At this point, add a few drops of the starch solution to the jar turning the sample solution blue. Continue following the instructions with the kit, adding drops of sodium thiosulfate until the solution in the vial turns clear.

MEASURING CONDUCTIVITY

The project uses YSI Model 30 Handheld Salinity, Conductivity and Temperature System meter to measure conductivity. Reading the comprehensive manual accompanying the meter is highly recommended before use in the field.

There are a few things worth noting here:

- It is essential to keep the probe clean, rinse with clean water immediately after use. If additional cleaning is necessary, use a solution of a foaming acid tile cleaner such as Dow Chemical Bathroom Cleaner and use the enclosed nylon brush. Rinse thoroughly with de-ionized or clean tap water.
- Dry the probe before storage.
- Measurements can be made in Conductivity or Specific Conductance modes. The Specific Conductance mode compensates the readings to a constant temperature (25°C). Having the data in Specific Conductance measurements allows for the data to be compared over time and over different sites, therefore the data should be recorded in Specific Conductance readings. When measuring in Specific Conductance mode the large numbers will be followed by either a uS or mS and the ^{0}C will be flashing.
- The YSI 30 meter will not function correctly in Specific Conductance mode at water temperatures below 2^{0}C. At these temperatures the meter must be put into Conductivity mode (the ^{0}C symbol will NOT be flashing) and the reading will need to be compensated to 25^{0}C using the following equation:

$$\text{Specific Conductance } (25^0C) = \frac{\text{Conductivity}}{1 + TC^*(T - 25)}$$

Where: TC is a temperature correction factor = 0.0191 as per Standard Methods Section 2510B

T = temperature of water at measurement

As an example, if one were adjusting a Conductance reading of 100 taken at 1.8°C, the calculation would look like this:

$$\frac{100}{1 + 0.0191(1.8-25)} = \frac{100}{1 + 0.0191(-23.2)} = \frac{100}{1 + -0.443} = \frac{100}{0.557} = 179.5 \text{ uS/cm}$$

MEASURING pH

The Oakton pH Testr 30 probes used in the project must be conditioned by soaking the probe in tap water (NOT de-ionized water) for 30 minutes before use. Conditioning does not have to be repeated if the probe does not dry out, but conditioning can be repeated if the Probe does dry. To prevent drying out, a small piece of cloth or sponge should be placed next to the bulb on the sensor, using the supplied Storage fluid. If no storage solution is available, use pH 10 buffer solution or saline solution. DO NOT USE PLAIN WATER TO STORE THE PROBE as this will draw out the ions and damage the probe.

The pH meter will need to be calibrated before each monthly sampling, following the instructions accompanying the meter.

The buffer and storage solutions should be within the Expiry Date noted on the side of the bottles. The project coordinator will inquire once a year if re-agents are either depleted or near to being out-of-date and re-order necessary supplies.

MEASURING TURBIDITY

The project uses Hach 2100Q Portable Turbidimeter that is accompanied by a User Manual. Instructions for the start-up, calibration, sampling and maintenance instructions are found in the manual. There are a few points important to remember:

Settings:

- Follow the instruction manual to set Day/Time, Language, Sample ID, Operator ID. For the date, it's suggested that the mm-dd-yyyy 24hr option is chosen.
- Set a Sample ID for each sample site and then choose the appropriate Sample ID when sampling so that the readings are stored associated with the correct site. To create a Sample ID, press the Settings button (symbol of a wrench) and choose 'Create New ID' and press 'Select'. Select the appropriate letters/numbers by using the arrow keys on the meter. Numbers are listed after the letter 'Z'.
- Enter an Operator ID using the same procedure.

Calibration:

- Calibration of the meter needs to be done before each monthly sampling. If the meter is used more frequently than that, some testing will have to be done to determine how frequently calibration is necessary.

- Wipe the reference jars with a very light coat of the supplied oil. This helps to remove fingerprints, other dirt and cover scratches. It shouldn't be necessary to use the oil with each calibration but you should wipe the jars with the cloth with each use. DO NOT OPEN THE REFERENCE SAMPLE JARS.
- When doing the first calibration, it is necessary to select the correct range. Do this by:
    - Push the Calibration key,
    - Then push the Options key
    - Select 'Cal Curve: StablCal'
    - Select 'StablCal (0-1000 NTU)'
    - Select 'OK'
    - Then proceed with the calibration process
- It's very important to shake the reference bottles before inserting them in the meter. This is especially important for the 800 NTU bottle that settles quickly. This can cause an 'out-of-acceptable-range' reading by the meter and prevent the calibration process from proceeding.

Sampling:

- When taking actual readings on the stream, it is important to oil and wipe the sample jars with the supplied oil and very important to clean the sample jars after use.
- The sample jar must be dry on the outside before insertion into the meter. Wipe the jar with a soft lens cloth, of the type that can be obtained from an optometrist or photography store.
- If the water being tested is very clear, rinsing with distilled water is adequate but if the water is not very clear, the bottle needs to be washed as well as rinsed. Please use one of the 'green' phosphate-free dish detergent products and obtain distilled water from a local pharmacy.
- The sample jars must NOT be allowed to air-dry, i.e., wipe the outside of the jar with a soft lens cloth, and they must be stored filled with distilled water.
- In case batteries die in the field, please pick up some extra batteries to have in the case, if needed. Note that the charge left in the battery is shown in the upper right hand corner of the opening screen.

Data Management:

- The meter stores the readings of the calibration process if you choose 'Store' after the process is complete.
- The meter automatically stores the sample readings. The readings will be listed under the Sample ID chosen by pressing on the Settings button (symbol of a wrench), then choosing 'Sample ID' and pressing 'Select'. Choose 'Select Sample ID' and press 'Select'. Then choose the correct Sample site and press 'OK'.
- To view the data, press the Data Management button (symbol of a file folder), then choose 'View Data Log' and press 'Select'. Choose 'Reading Log' (or Calibration Log, Verify Calibration Log or All Logs by Date) and press 'Select'. Choose a data entry (listed by date and time and showing the reading) and press 'Select' to view the full data, including which Sample Site the reading was taken at.

MEASURING SLOPE

Slope represents the stream gradient and it influences sediment transport and discharge characteristics. It is the difference in elevation at the upstream and downstream ends of a stream segment, divided by the total distance between the upstream and downstream points $(DS_{ht} - US_{ht}) \div (DS_{dis} + US_{dis})$.

Slope can be measured in a number of ways:

- Using a topographic map
- Using a Clinometer
- Using a hand level
- Using survey equipment

Measuring slope with either a topographic map or Clinometer is described in the CABIN Field Manual (http://ec.gc.ca/Publications/default.asp?lang=En&xml=C183563B-CF3E-42E3-9A9E-F7CC856219E1) but neither method is considered very accurate. Preferable methods are to either use a hand level or survey equipment, with survey equipment being the most accurate.

Each group in the project will now have a hand level (CST/Berger 8" hand Level) and a specialized measuring tape marked similarly to a surveyor's graduated rod, called a mini-rod. The project owns 2 sets of surveyor's equipment that can be transported to each group as needed. Because the slope at any of the sites will probably not change during the project, each group will likely only need to use the survey equipment once for each of their sample sites.

The procedures for measuring slope using these tools are also described in the CABIN Field Manual. Key things to remember when using either method are to ensure:

- The hand level or survey equipment is set up at a location at the water's edge with the rod supporting the level placed on a hard surface at the level of the water. Using a rod to support the hand-level ensures that the level remains at the same height above ground level.
- If using survey equipment, the transit, or automatic level, will sit on the accompanying tripod, placed securely at water's edge.
- The graduated rod or mini-rod is placed at water level to make the measurements
- The graduated rod or mini-rod is held vertical without leaning.

Procedure for Using Hand Level to Measure Slope

Following the directions in the CABIN Field Manual:

- Have a person take a mini-rod upstream from where the hand-level is being set up.
- Record the distance from the place where the hand-level is set up to the location of the mini-rod on the field sheet.
- Steady the hand-level on a pole, such as a meter stick, at a spot on the edge of the creek, at water level.
- Hold the hand level so that the bubble level is on top and look through the end with the smaller hole.
- To see the cross hairs at the other end of the level, pull out the eyepiece until the cross hairs are in focus.
- Level the hand-level by lining the bubble visible through the lens with the center cross hair.
- Focus on the mini-rod by adjusting the eyepiece at the far end of the hand-level.
- Record the measurement on the graduated rod that indicates the height above ground level on the field sheet.
- The mini-rod extends to a length of 2 meters and is marked in metric units on both sides of the tape. It is marked in decimeter sections so the large numbers each indicate 10cm. The small markings each indicate 0.5cm. So a measurement at the top of the second coloured bar above the number 5 would indicate 5 decimeters plus 4 times 0.5cm which equals 52cm or 0.52m. The little triangular markings indicates 5cm between the decimeter sections. The 1m height is indicated by a different coloured number 1 and with an 'm' below it. The decimeter sections above the 1m mark would be therefore be measurements greater than 1m or 100cm. For instance, a reading at the small triangular mark above the meter mark and below the 2 would be read as 1.15m or 115 cm.

- Fill in the field sheet by following the directions for 'b. hand level and measuring tape'
- Repeat this procedure downstream from the position of the hand-level, again noting the height measurement on the field sheet and the distance from the hand-level position to the mini-rod. It is imperative that the position of the hand-level not change from the upstream to downstream measurements.
- Calculate the total horizontal distance that is the sum of the distance upstream from the hand level location plus the distance downstream from the hand level location. On the field sheet this is indicated as $US_{dis} + DS_{dis}$
- Calculate the total change in height by subtracting the height of the rod downstream from the height of the rod upstream. On the field sheet this is indicated as $DS_{ht} - US_{ht}$.
- Calculate the slope by dividing the change in height by the total distance and record on field sheet. $\frac{(DS_{ht} - US_{ht})}{US_{dis} + DS_{dis}}$

Procedure for Using the Tripod Survey Equipment

The project owns two transit heads, two tripods and two collapsible graduated rods. Sets of this equipment can be transported to the participating groups as needed. A manual explaining how to use the equipment accompanies the equipment but this section will provide some additional tips.

Setting up the tripod:
The tripod has three legs that are held in together when the legs are collapsed. To release the legs, unscrew the orange tightening screws found on each leg and pull the legs down far enough that they can be spread out. Spread the legs far enough to provide a stable base and adjust the length of the legs so that top of the tripod is roughly level, tightening the leg screws to hold the leg length. Step on footpads on each leg to fix the tripod solidly in the ground. Make any adjustments necessary to leg length to return to horizontal position. After use, close the legs before collapsing the leg length. This prevents the legs from opening in transport.

Attaching the automatic level (transit) to the tripod is done by fitting the bolt fitted to an orange handle on the head of the tripod into the screw hole in the bottom of the instrument. Tighten firmly but not so tight as to strip the screw.

Leveling the instrument is critical to determining slope. There is a bubble level on the base of the instrument. If the instrument is far out of horizontal, adjust the legs of the tripod and then fine-tune with the foot screws to center the bubble. Once the instrument is leveled, the head of the instrument can be rotated without changing the level so that readings can be taken both upstream and downstream from this same position.

Once the transit is set up, the procedure for measuring slope is very similar to that using the hand level, except that there is an option to use the collapsible graduated rod instead of the mini-rod. The graduated rod has metric measurements on one side and Standard measurements on the other. It extends to up to 5 meters (16ft. 5in.). When extending the rod, do so from the bottom up, until you reach a height appropriate to the situation, ensuring that the each section clicks into the tab that secures the section. To collapse the rod, push the black button in each section until fully collapsed.

This project uses metric units so hold the rod upright on a solid surface at water level with the metric units facing the automatic level. The rod is divided into decimeter sections, so the large units '00', '10', 20', etc. indicate 10cm increments. The smaller markings indicate 1cm increments. Therefore if you are making a reading in the section with a '18' and then at the top

of the second red mark, the height measurement would be 18 decimeters plus 4cm which is 184cm or 1.84m

Record the measurements and record on field sheet in the same manner as described in the 'Procedures for Using Hand Level to Measure
Slope' section.

ANOMALIES IN WATER CHEMISTRY DATA

Most of the water chemistry sampling within the project consists of single samples or single equipment readings that are taken at specific sites on specific dates. From a general monitoring perspective this is adequate as a watchdog procedure, because we can compare the parameter readings to BC or Canadian public health and aquatic health standards.

The project sampling design does not include enough replicate samples to detect significant differences between sites within a watershed, or between watersheds. In order to carry out any significant statistical analysis, we would need to replicate each sampling procedure 8–10 times at different stream locations within the sample site each sampling event. The expense of this extra sampling goes beyond the scope of the Water Quality Monitoring project.

If any group observes dramatic changes within the water chemistry parameters currently being collected and/or if the data results exceed water quality standards this condition is deemed an anomaly. Anomalies signal the need for the Groups to carry out a more detailed examination of the watershed in an attempt to determine the root cause of the change.

Procedures - Water Chemistry Data Anomalies

Both the Ministry of Environment and Environment Canada indicated that when they encounter anomalies in their data, they allocate significant time to review the situation, before deciding to take further action.

Groups are strongly encouraged to review their monthly data when they receive it, so they can catch any anomalies early.

1. When encountering aberrant data, Groups should check the field notes created during the sampling session to see …
    a. If there might have been a transcription error
    b. If the meters were calibrated correctly
    c. If any extraordinary conditions were reported
    d. If there was a possibility that the sample was contaminated
    e. If there was a possibility that the sampling procedures skewed the data (e.g. stirring up sediment)

2. If the aberrant data is the result of a meter reading – groups can carry out additional meter readings in different stream location within the sample site to see if the anomalous data remains the same

3. If the data in question came from Maxxam Analytics, the lab routinely saves the original sample for short period so that Groups can ask the project coordinators to arrange a re-analysis of the original sample to see if the aberrant data reading holds

4. In the event that Groups determine the aberrant data holds over multiple sampling events they should then …
    a. Contact project coordinators
    b. Coordinators will contact the Ministry of Environment

c. MoE staff will review the data to determine whether an independent review is merited

Further actions will depend on MoE's recommendations

QUALITY ASSURANCE/QUALITY CONTROL SAMPLING

To do the QA/QC, groups will do regular monthly sampling and then have the lab do a replicate analysis of the monthly monitoring parameters as well as the parameters normally done by project meters; (pH, turbidity, specific conductivity). In this way we can check the reliability of the both the lab analysis and of our equipment. A 'blank' sample is also analyzed which checks for contaminants from the air that might be influencing the water sample. This is the jar filled with distilled water that will come in the Maxxam cooler. The QA/QC sampling should be done in May.

QA/QC Maxxam COC

As in the regular Chain of Custody (COC) form, the QA/QC COC comes with some of the basic information already completed. *** Note: An example of a completed QA/QC Maxxam COC can be found at **Page 2-Appendix**.

Along the top section, the Invoice Information and Report Information are already filled out. In the Project Information section the Quotation # and Project # are filled out but the other lines need to be filled out. Please complete the section in the following manner:

Column Name	**Entry**
P.O. #	Leave blank
Project Name	Enter name of creek (e.g., Lardeau R)
Site #	Enter site code where sample taken
Sampled by	Enter name of person taking samples

In the middle section, Maxxam will have filled out the parameters to be analyzed but the rest of the information will need to be completed by the sampler. Because there are 4 sample jars (but 3 samples) associated with the QA/QC sampling, the entries on the form are somewhat different from the regular monthly sampling. Please fill out the form as follows:

Column Name	**Entry**
Sample Barcode	Leave blank
Line 1-Sample (Location) Identification	Enter site code where sample is being taken and note 'Sample 1 Regular' (eg. NAWIN03 Sample 1 Regular)
Line 2-Sample (Location) Identification	Enter site code where sample is being taken and note 'Sample 2 Replicate' (there will be 2 jars in Sample 2 which will be noted in the # of bottles column, below)
Line 3-Sample (Location) Identification	Enter site code where sample is being taken and note 'Sample 3 Blank'
Date Sampled	Date sample is being taken
Time Sampled	Time sample is being taken, include am or pm and time zone (e.g. 09:30am PDT)
Matrix	Enter H2O
Metals Field Filtered	Enter N
Alk, NO2, NO3, Orthophosphate	Enter check mark or x for all three samples
Conductance, turbidity, pH	Enter check mark or x for Sample 2 and Sample 3, leave Sample 1 blank

# Of Bottles	Enter 1 for Sample 1 and Sample 3, Enter 2 for Sample 2
Comments	Enter comments on weather, conditions on site, activities, temperature
	Enter cc: e-mail of person to receive data (e.g. cc: bunky@burtoncity.ca)

It is also important to fill in the bottom section as this provides information on how the sample (cooler) is handled and when it reaches different locations. Please complete this section as follows:

Column	**Entry**
Relinquished by (Signature/Print)	Enter name of person leaving cooler at courier, both signature and printed for legibility
Date (YY/MM/DD)	Enter date including year/month/day
Time	Enter time cooler given to courier, include am/pm and time zone
Received by (Signature/Print)	Enter name of person at courier company (or name of company), signature and print for legibility
Date (YY/MM/DD)	Enter date courier received the cooler, including year/month/day
Time	Enter time courier received the cooler, include am/pm and time zone (e.g. 10:30am PDT)
# Jars Used and Not Submitted	Normally enter 0
Time Sensitive	Check box
Laboratory Use Only	Leave blank

Once completed, including the signature of the courier, place the white copy in the provided zip-loc bag and place in cooler to accompany the sample to Maxxam. Keep the yellow copy for your own records.

QA/QC Sample Jar Labels

You will be sending in 4 sample jars. In order for the lab to do the proper replicate analyses, it's really important that the jar labels are filled out correctly as follows:

*** Examples of the Sample Jar Labels can be found on the **Page 5 - Appendix.**

Sample 1: This is the regular sample that is taken monthly. It includes one sample bottle, labeled as follows:

Column name	**Entry**
Sample I.D.	Site Code Sample 1 Regular (eg NAWIN03 Sample 1 Regular)
Company Name	Your group name (eg Wildsight Invermere)
Project Ref:	CBWQM
Analysis	Alkalinity, NO2/NO3, Orthophosphate
Preservative	n/a
Date	Date sample taken
Time	Time sample taken, include am or pm and time zone (e.g. 12:30pm MST)

Accompany this sample with the usual analysis using the project equipment for Dissolved Oxygen, pH, Turbidity and Specific Conductivity.

Sample 2: this is the replicate sample and includes 2 bottles. Bottle #2 which is the first of the Sample 2 bottles is labeled as follows:

Column name	Entry
Sample I.D.	Site Code (e.g. NAWIN03 Sample 2 Replicate)
Company Name	Your group name (eg Wildsight Invermere)
Project Ref:	CBWQM
Analysis	pH, Specific Conductivity, Alkalinity
Preservative	n/a
Date	Date sample taken
Time	Time sample taken, include am or pm and time zone (e.g. 12:30pm MST)

The third bottle (the second of the Sample 2 bottles) is labeled as follows:

Column name	Entry
Sample I.D.	Site Code Sample 2 Replicate (e.g. NAWIN03 Sample 2 Replicate)
Company Name	Your group name (e.g. Wildsight Invermere)
Project Ref:	CBWQM
Analysis	Turbidity, NO2/NO3, Orthophosphate
Preservative	N/a
Date	Date sample taken
Time	Time sample taken, include am or pm and time zone (e.g. 12:30pm MST)

Sample 3: this is the blank and should arrive from the lab filled with distilled water. For this sample DO NOT take a water sample from the creek. Instead, holding the bottle above the creek, open the lid and hold it there for approximately the same amount of time it would take to take a water sample. Then replace the lid. Be very careful to not touch the top of the bottle or the inside of the lid with your hands.

Column name	Entry
Sample I.D.	Site Code Sample 3 Blank (e.g. NAWIN03 Sample 3 Blank)
Company Name	Your group name (e.g. Wildsight Invermere)
Project Ref:	CBWQM
Analysis	Alkalinity, NO2/NO3, Orthophosphate, pH, Turbidity, Specific Conductivity
Preservative	n/a
Date	Date sample taken
Time	Time sample taken, include am or pm and time zone (eg. 12:30pm MST)

CABIN MONITORING

CABIN (Canadian Aquatic Biomonitoring Network) sampling takes place once a year in September or October at each of the three sites of each group in the project. The CABIN procedures are described in the CABIN Wadeable Streams Field Manual, found at: http://www.ec.gc.ca/Publications/C183563B-CF3E-42E3-9A9E-F7CC856219E1/CABINFieldManual.pdf

During this sampling, the CABIN field sheets are filled out for each site and include data collection on Habitat, Water Quality and Benthic Macro-Invertebrates. The most current CABIN field sheets can be found at the CABIN website at: http://ec.gc.ca/rcba-cabin/74876ADD-8158-49CD-94E3-FC21D5A2C2E7/CABIN%20FieldSheet%20EN%202011.pdf
Three complete sets of field sheets, one for each site, should be printed out on waterproof paper and entries made in pencil. Please note that Environment Canada recommends using a wooden meter stick for the measurement of velocity.

The water quality parameters measured at each CABIN site are the same as those taken each month at only one of those sites and with the addition of a sediment sample to be analyzed for metals content taken from one of the sites. (See Sediment Sampling Procedures described below) These samples need to be sent to Maxxam labs for analysis, completing the Maxxam COC and sample jar labels as described below. Because some of the analyses carried out by the lab are time sensitive, it is important to take the water and sediment chemistry samples from all three sites in one day and sent to Maxxam via courier the same day (early in the week, so as to avoid weekends) so that the samples reach the lab within 48 hours, even if this means that some of the other CABIN field work is completed the next day.

Benthic Macro-Invertebrate samples are taken at each of the three sites, following the CABIN procedure for macro-invertebrate collection as described in the CABIN Manual. The macro-invertebrate samples need to be preserved in either 95% ethyl alcohol or 99% isopropyl alcohol, sealed tightly in plastic jars, taped shut, labeled correctly (described below), placed in sealed plastic bags, packed in absorbent packing such as newspaper, accompanied by a EcoAnalysts COC (described below) and sent to:
Mainstreams
436 Fortier St
Kimberley, BC
V1A 1N6

*** Note: A completed Macro-Invertebrate Jar Label is provided on **Page 6-Appendix**.

All the macro-invertebrate samples from the project groups are compiled and sent to EcoAnalysts Inc. for analysis. Because Ecoanalysts are located in Idaho and the preservative is considered a Hazardous Material, the samples must go through an expensive procedure at the border and so all the samples are sent together. EcoAnalysts also enters the macro-invertebrate data into the CABIN database, except for those groups who wish to enter their own data.

CABIN MONITORING CHECKLIST

EQUIPMENT	DATES					
CABIN Field Sheet (waterproof)						
CABIN Manual						
Camera						
Macro Kick Net						
Stopwatch						
Tweezers						
Squeeze Bottle						
Macro Sample jars (6 - 500ml)						
Macro Sample jars (6 - 250ml)						
Jar Labels (27 - waterproof)						
Ethanol 99% (2L)						
Bucket						
Meter Stick (wooden for velocity)						
Ruler (small metric-rock count)						
Measuring Tape (30m)						
Hand Level/w Portable Rod						
WQ Sample bottle labelled						
Cooler (Maxxam)						
Ice Pack						
Maxxam COC						
Thermometer						
Waders & Boots						
Waterproof Gloves Insulated						
pH meter (calibrated)						
pH Meter spare batteries						
pH Meter Manual						
Turbidity Meter (Calibrated)						
Turbidity Meter Manual						
Conductivity Meter						
Conductivity Meter Manual						
Sp. Batteries (Turbidity/Conductivity)						
DO Hach Kit						
DO Hach Kit Instructions						
Clipboard						
Felt Pen – Ink Pen - Pencil						
First Aid Kit						
Spare Rain/Cold Weather Clothes						
PFD (Life Jacket)						
Throw Bag						
Safety Rope						
Cutting Knife - Scissors						
Multi-screwdriver						
Duct Tape						
Topo Map or GPS						
Tailboard (emergency numbers)						

SEDIMENT SAMPLING PROCEDURES

Field Procedures

- Find a pool where fine sediments settle
- Rinse all instruments being used in the stream water
- Use a stainless steel or Teflon pot/scoop
- Scrape the surface of sediment trying to get mostly fine sediments
- Collect 4-5 scoops from different parts of the pool
- Using rubber gloves, remove large stones
- Mix the sample scoops in nalgene or polyprolene bottle (500ml or 1L) by shaking or mixing in a stainless steel bowl
- Pour some of the mixed sample into the sample bottle from Maxxam Lab, which will be either a 125ml or 250ml glass bottle
- Ensure that most of the sample is fine sediment, but that there is a shallow covering of stream water

Labeling

- Label the sample jar appropriately and send to lab with the water samples taken at same time (See an example label on **Page 5 - Appendix**

Other Field Activities

- Measure and record the conductivity, turbidity and pH of the water at same time
- These measurements will be taken as part of your regular Field Chemistry sampling

Notes:

- It is important to NOT use an aluminum pot
- Do NOT wash instruments with soap or acid as this will release metals
- The sediment sample could be mixed in a stainless steel or Teflon or glass bowl if necessary
- Use a stainless steel or nylon stirring instrument

CABIN MAXXAM COC (Chain of Custody)

As in the regular Chain of Custody (COC) form, the CABIN COC comes with some of the basic information already completed. Along the top section, the Invoice Information and Report Information are already filled out. In the Project Information section the Quotation # and Project # are filled out but the other lines need to be filled out. Please complete the section in the following manner: *** Note a completed example is provided at **Page 3-Appendix**.

Column Name	Entry
P.O. #	Leave blank
Project Name	Enter name of creek (e.g. Salmo R)
Site #	Enter site codes where samples taken
Sampled by	Enter name of person taking samples

In the middle section, Maxxam will have filled out the parameters to be analyzed but the rest of the information will need to be completed by the sampler. There will be 3 sample jars for water chemistry samples, one for each site, as well as 1 sample jar for a sediment sample from one of the sites. As usual, enter cc: email of person to receive the data in the Comments section. Please fill out the form as follows:

Column Name	Entry
Sample Barcode	Leave blank
Line 1-Sample (Location) Identification	Enter site code where sample taken (e.g. NESLM01)
Line 2-Sample (Location) Identification	Enter site code where sample taken (e.g. NESLM02)
Line 3-Sample (Location) Identification	Enter site code where sample taken (e.g. NESLM03)
Line 4-Sample (Location) Identification	Enter site code where sediment sample taken (e.g. NESLM02)
Date Sampled	Date sample taken
Time Sampled	Time sample taken, include am or pm and time zone (e.g. .09:30am PDT)
Matrix	Enter H2O for Line 1,2,3 Enter Soil for Line 4
Metals Field Filtered	Enter N
Alk, NO2, NO3, Orthophosphate	Enter check mark or x for all three water samples
CSR/CCME Metals in Soil	Enter check mark or x for the sediment sample
# of Bottles	Enter 1 for each Sample
Comments	Enter comments on weather, conditions on site, activities, temperature Enter cc email of person to receive the data (e.g. cc: chillier@gmail.com)

It is also important to fill in the bottom section as this provides information on how the sample (cooler) is handled and when it reaches different locations. Please complete this section as follows:

Column	Entry
Relinquished by (Signature/Print)	Enter name of person leaving cooler at courier, both signature and printed for legibility
Date (YY/MM/DD)	Enter date including year/month/day
Time	Enter time cooler given to courier, include am/pm and time zone
Received by (Signature/Print)	Enter name of person at courier company (or name of company), signature and print for legibility
Date (YY/MM/DD)	Enter date courier received the cooler, including year/month/day
Time	Enter time courier received the cooler, include am/pm and time zone (e.g. 10:30am PDT)
# Jars Used and Not Submitted	Normally enter 0
Time Sensitive	Check box
Laboratory Use Only	Leave blank

Once completed, including the signature of the courier, place the white copy in the provided zip-loc bag and place in cooler to accompany the sample to Maxxam. Keep the yellow copy for your own records.

LABELING CABIN MAXXAM WATER AND SEDIMENT SAMPLE JARS

The four sample jars from the lab must be labeled correctly in order to receive the appropriate analysis. These samples are accompanied by a Maxxam COC form, placed into a cooler with an ice pack and sent to the Maxxam lab right away via courier so that the sample arrives in Burnaby within 48 hours.

Label the 3 water chemistry jars as follows:

*** Examples of the Sample Jar Labels can be found on **Page 5 – Appendix**

Column name	Entry
Sample I.D.	Site Code where sample taken (e.g. NGSTM01 for 1 jar, NGSTM02 for second jar, NGSTM03 for third jar)
Company Name	Your group name (e.g. SMVRRS)
Project Ref:	CBWQM
Analysis	Alkalinity, NO2/NO3, Orthophosphate
Preservative	n/a
Contaminant Level	Low
Date	Date sample taken
Time	Time sample taken, include am or pm and time zone (eg. 12:30pm MST)

Label the 4th jar for the sediment chemistry as follows:

*** An example of a Sediment Jar Label is provided at **Page 5-Appendix**.

Column name	Entry
Sample I.D.	Site Code where sample taken (e.g. NGSTM01)
Company Name	Your group name (e.g. SMVRRS)
Project Ref:	CBWQM
Analysis	Metals
Preservative	n/a
Contaminant Level	Low
Date	Date sample taken
Time	Time sample taken, include am or pm and time zone (e.g. 12:30pm MST)

LABELING/SHIPPING MACRO-INVERTEBRATE SAMPLES

Preservative

- To preserve your macro-invertebrate samples use 95% ethanol, or 99% isopropyl alcohol – Usually available at either pharmacies or grocery stores. Note that both these alcohols are sometimes labeled as Rubbing Alcohol – look closely at the label
- Fill half the jar with sample - half with ethanol
- If ethyl alcohol cannot be found at your local drugstore, use 99% isopropyl alcohol but only fill the jar 1/3 with sample, 2/3 with isopropyl alcohol

Labeling on the Outside of the Sample Jar

*** An example of a Macro-Invertebrate Jar Label is provided at **Page 6-Appendix**.

- Note on the jars and on the lid, the following (using felt pen on masking tape works well – or cover paper with clear cello tape):
    - Sample site
    - Date
    - Sampler
    - #Jar per #of Jars that site (i.e. #2 out of 3 Jars site NGJOS01)
    - Preservative used (e.g. 95% ethyl alcohol or 99% isopropyl alcohol)
    - Print the same information on the lid of each Jar as is on the side and inside

Labeling inside the sample Jar

- It is really important that a piece of waterproof paper with the same info as has been placed on the jar is placed inside the jar with the sample.
- Cut one of your pieces of waterproof paper into smallish pieces that will fit into the jars
- Write in pencil the sample site, etc and place in the jar before sealing
- This will ensure that the taxonomist that works with the sample matches the right sample with the right site, even if the lid goes astray or the information on the outside of the Jar becomes illegible
- Insert in each macro-invertebrate sample jar, the following information:
    - Sample site
    - Date
    - Sampler
    - #Jar per #of Jars that site (i.e. #2 out of 3 jars site NGJOS01)
    - Preservative used (e.g. 95% ethyl alcohol or 99% isopropyl alcohol)

ECOANALYSTS COC (Chain of Custody) FORM

- The macro-invertebrate samples from the project are sent to the Coordinators, who send all the samples to EcoAnalysts Inc: Life in Water in Moscow, Idaho. The samples must be accompanied by a Chain of Custody (COC) form which lists the sites, number of containers of macro-invertebrate samples per site and details about the method and habitat the samples came from. In addition, the form articulates who has handled the samples before reaching the lab.

- The COC form can be found on the EcoAnalysts website at www.ecoanalysts.com . Click on either the 'About Us' tab and choose 'Sending Samples' or go to the bottom of the page to 'Links' and choose 'Sending Samples'.

- This will bring up a form with an example entry on it. For your sample, delete the line with the example on it and print off a form for your use.

Filling Out the EcoAnalysts COC (Chain of Custody) Form

*** NOTE a completed example is provided at **Page 4 - Appendix**.

Column Name	Entry
EcoAnalysts Project#	Leave blank
Company	Name of your group
Total # Samples this Project	Number of sites collected from
# of Samples Shipped this Shipment	Same of Total # Samples this Project if have shipped samples from all your sites
Column with no heading	Number of sites sampled – for this project there will be 1, 2, 3
#Of Containers	Number of jars with macro-invertebrate samples from each site
Stream	Name of stream sample taken from
Site #	Site code of site sampled
Rep	Leave blank
Device Type	Kicknet
Device Dimensions	n/a
Habitat	Stream habitat sample taken from
Collection Date	Date sample was taken
Notes	Anything of note about conditions, events, etc
Relinquished by: Date	Date sample sent to coordinators
Relinquished by: Company	Name of your group and your name
Relinquished by: Condition	Condition of the samples when sent

Shipping

- Please ensure that:
  - The lids are tightened
  - Lids are taped with duct tape
  - Jars are wrapped in a plastic bag
  - Plastic bag holding the Jars is placed in a box with absorbent packing (like newspaper)
  - The EcoAnalysts COC is included
  - Send to:

Laura Duncan
436 Fortier St.
Kimberley, BC
V1A 1N6

Send bills for preservative and shipping to Jim at the address above or e-mail them to jim.duncan9@me.com

CABIN DATA ENTRY

Access to the CABIN database will not be given without being certified in DATA ENTRY by Environment Canada. Therefore, those entering CABIN data will have either taken the training with Stephanie Strachan of Environment Canada in 2007 or have completed the on-line CABIN Data Entry module through the Canadian Rivers Institute at the University of New Brunswick and so should have a good knowledge of how the CABIN website works and how to correctly enter the data. However, there are some aspects of the data entry which were not covered in the Data Entry module or which are not immediately obvious on the website. This section will not try to completely describe the data entry process but rather will try to give direction to some of the less obvious aspects.

Site Information
When setting up a new site, one of the questions you are asked is 'Watershed'. Choose the appropriate watershed:

- Joseph Cr Central Columbia
- St. Mary R Central Columbia
- Windermere Cr Upper Columbia
- Horse/Ventego Cr Upper Columbia
- Lardeau Lower Columbia
- Burton/Snow/Caribou Central Columbia
- Slocan Central Columbia
- Salmo Salmo

(From: http://map.ns.ec.gc.ca/kyw/)

Basin - Another question you are asked is 'Basin Name'. Enter a local name and once the coordinates for the site are entered into the database, a Know Your Watershed (KYW) basin name will be assigned by the database. There have been problems with the KYW ID section and is currently not available. Once it is up and running again, you may have to re-enter the location coordinates and refresh the page.

Stream Order – although the spreadsheet we have received from the BC Ministry of Environment gives a Stream Order for our sites, they calculate this using 1:20,000 scale maps. Environment Canada uses 1:50,000 scale maps to calculate Stream Order so you will have to determine stream order of your sites by manually going the process as described in the CABIN Field Manual. Information on obtaining 1:50,000 scale maps can be found on Page 9.+

Ecoregion - To determine Ecoregion, once you click on the drop-down menu for 'Ecozone', choose 'Mountain Cordillera'. Once that is entered, the Ecoregion button has a drop-down menu. Either choose from that menu, or click on the 'Intereactive Ecoregion Map' button. Once the map comes up, click on the Mountain Cordillera area and choose the appropriate area shown on the map that comes up.

Miscellaneous - The sampling device we use is a kick-net, 400um Mesh size and a 3 minute Kick Time.

When it comes to adding a sample to a site, choose 'Test' NOT 'Potential Reference'.

Habitat Data

When starting to enter data for the site visit, beginning with entering 'CABIN Field Sheet' first is a good idea as some of the parameters added from the other categories are also entered here and it prevents you entering them more than once.

Longitude must be entered as a negative value, for example, -115° 41' 12". To convert latitude/longitude values from Degrees/Minutes/Seconds to Decimal Degrees or to GPS coordinates, or vice versa, a good conversion website is http://www.csgnetwork.com/gpscoordconv.html .
For Datum, please use GRS80 (NAD83, WGS8) if possible.

When entering Elevation, please remember to indicate whether the values being entered are in meters (masl) or in feet (fasl).

The CABIN website has a time limit where if there is no action on the site within a certain amount of time, it will log you out and you must then log in again. This can cause data which has been entered and not submitted to the site to be lost. Since there are a lot of items to enter on the

Field Sheet page, it is quite easy to find you are timed out before entering everything. If you enter the location coordinates and the pebble count data first, then scroll to the bottom of the page and click on 'Submit Field Sheet Data', that information is saved. You can then scroll to the top of the page and enter the rest of the data before being timed out. After entering the Field Sheet data, you can then return to the Display Site Information page and choose the other Types of Data to enter. Remember that EcoAnalysts enter the Community Structure data for the project, except for the Salmo group who wishes to enter it for themselves.

When entering Habitat Data, it is important to click on the 'Include Non-Protocol' button beside the drop-down menu in the middle of the page. This adds a number of different categories of habitat data that can be added and it also adds some additional parameters within some of those categories.

Velocity & Depth – Enter the Velocity & Depth data by clicking the box indicating the use of the Velocity Head Rod method and use the Velocity Head Rod section of the form to fill in the depth and width measurements. The row labeled 'Depth (D) (cm) is the measurement of the water at various locations across the stream. The row labeled 'Flowing Water Depth' is the same measurement so simply repeat the entries from the 'Depth (D) (cm) row.

Water Chemistry - To add the water chemistry data, including the data from the project equipment, choose Water Chemistry from the menu and enter the values for the appropriate parameter, ensuring that the correct units are being used.

Click on 'Enter' after each entry. Alkalinity is entered under 'General – Alkalinity', enter the lab value for 'Alkalinity Total as CaCO3'.
Enter Dissolved Hardness as 'General - Hardness'.
Note that <values must be entered as 'zero'.

Sediment Chemistry - To enter the metals data from the sediment sample, choose Sediment Chemistry from the drop-down menu. You will note that the units on the CABIN website are either ppm or % while the data from the lab is in mg/kg. Fortunately, ppm is the same as mg/kg so the data in mg/kg can be entered as is. The proof of this is as follows:

- 1mg = 0.001 grams
- 1 kg = 1,000 grams
- 0.001/ 1,000 = 1/1,000,000 = one part per million

To convert data in mg/kg to a percentage, simply move the decimal point of the mg/kg value four places to the left. The proof for this is as follows:

- Since mg/kg = ppm = 1/1,000,000
- And 1% = 0.01 = 1/100
- Then, 1/1,000,000 is 1/10,000th of 1/100
- Then to convert from a part per million to a part per hundred, the ppm unit is divided by 10,000
- So, 1ppm/10,000 = 0.001/100 = 0.0001%

Ice Cover and Gradient – to run the CABIN model, the Ice Cover and Gradient<30% values must be entered into the database. This information has been provided by the BC Ministry of Environment and has been sent to all the groups in the project. These values must be entered separately for each site visit of each site. The procedure for entering these values is as follows:

1. Log-in to the CABIN database
2. Click 'Data Management' from the sidebar

3. Choose your project (e.g. CBWN Joseph Cr)
4. Choose Site Number from drop-down menu
5. Click 'Data' for a specific Site Visit
6. Choose Habitat Data from drop-down menu associated with 'Choose type data to enter'
7. Click box 'Include Non-Protocol'
8. Choose 'Landscape' from 'Data to Enter' box
9. Look for and click on 'Gradient <30(%)'
10. Enter appropriate data in the Value box (column AG on the AREA_PCNT tab of the Ministry of Environment spreadsheet)
11. Click 'Enter'
12. Look for and click on 'Landcover-Ice (%)
13. Enter appropriate data in the Value box (column L on the AREA_PCNT tab of the Ministry of Environment spreadsheet)
14. Click 'Enter'
15. If message appears saying 'the value falls outside of variables accepted range. Do you want to use it?' Click 'OK'
16. Repeat procedure for all visits to all sites

Many of the other variables listed on the spreadsheet from Ministry of Environment can also be entered but only the Ice Cover and Gradient 30% are necessary to run the CABIN Columbia Basin model.

Pictures - Please don't forget to upload the pictures from your site, including: Field Sheet, Upstream, Downstream, Across, Substrate (exposed), and Substrate (aquatic).

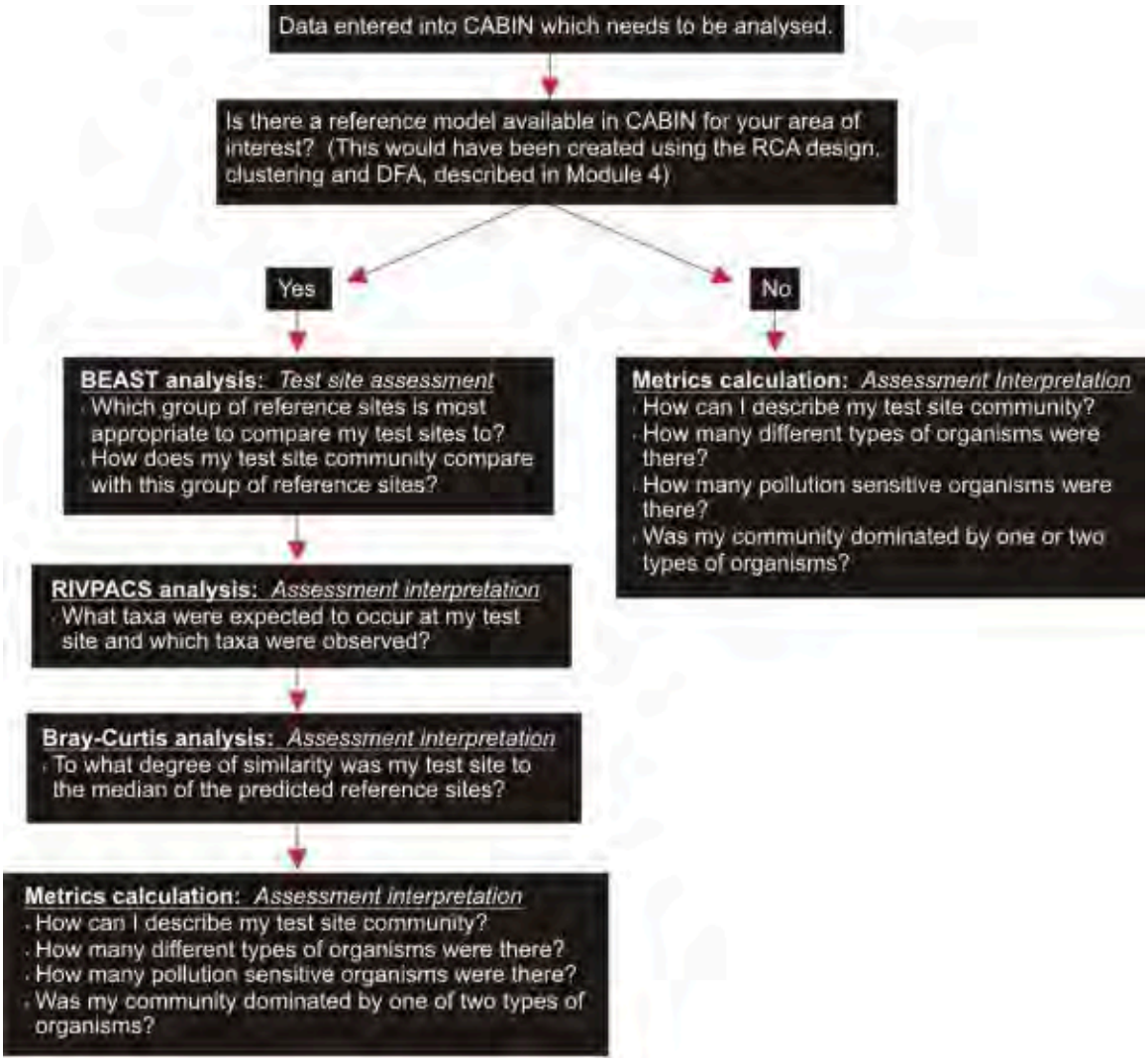
Once your data has been entered, click on 'Report' on the side bar of the 'Display Site Information' page and all of the site data will be displayed, including two of the pictures from the site. To view the remainder of the pictures, from the 'Display Site Information' page click on 'Data' beside the site visit date. Then Click on the 'Upload/View Images' tab and all the pictures uploaded onto the database for that site should show up. Click on an image to enlarge.

CABIN ASSESSMENT AND REPORTING

With the completion of the Columbia Basin Reference data, the Columbia Basin Water Quality Monitoring project partners can now create reports based on the CABIN model analysis.

The following background section is an extraction of Stephanie Strachan's CABIN online course notes from Module 5 'CABIN Assessment and Reporting'.

Schematic – CABIN Model Analysis


Data entered into CABIN which needs to be analysed.
Is there a reference model available in CABIN for your area of interest? (This would have been created using the RCA design, clustering and DFA, described in Module 4)
Yes
No
BEAST analysis: Test site assessment
Which group of reference sites is most appropriate to compare my test sites to?
How does my test site community compare with this group of reference sites?
Metrics calculation: Assessment Interpretation
How can I describe my test site community?
How many different types of organisms were there?
How many pollution sensitive organisms were there?
Was my community dominated by one or two types of organisms?
RIVPACS analysis: Assessment interpretation
What taxa were expected to occur at my test site and which taxa were observed?
Bray-Curtis analysis: Assessment interpretation
To what degree of similarity was my test site to the median of the predicted reference sites?
Metrics calculation: Assessment interpretation
How can I describe my test site community?
How many different types of organisms were there?
How many pollution sensitive organisms were there?
Was my community dominated by one of two types of organisms?

Evaluation of benthic sediment (BEAST)

The BEnthic Assessment of SedimenT (BEAST) has been adopted by CABIN as a tool for evaluating whether or not a test site is in reference condition, and if not, then how divergent it is from reference condition.

Test sites are plotted in the same ordination space as matched reference sites, and the distance of the test site from the reference space is used as an indicator of the degree of impairment. The further sites are from each other in ordination space, the more different they are.

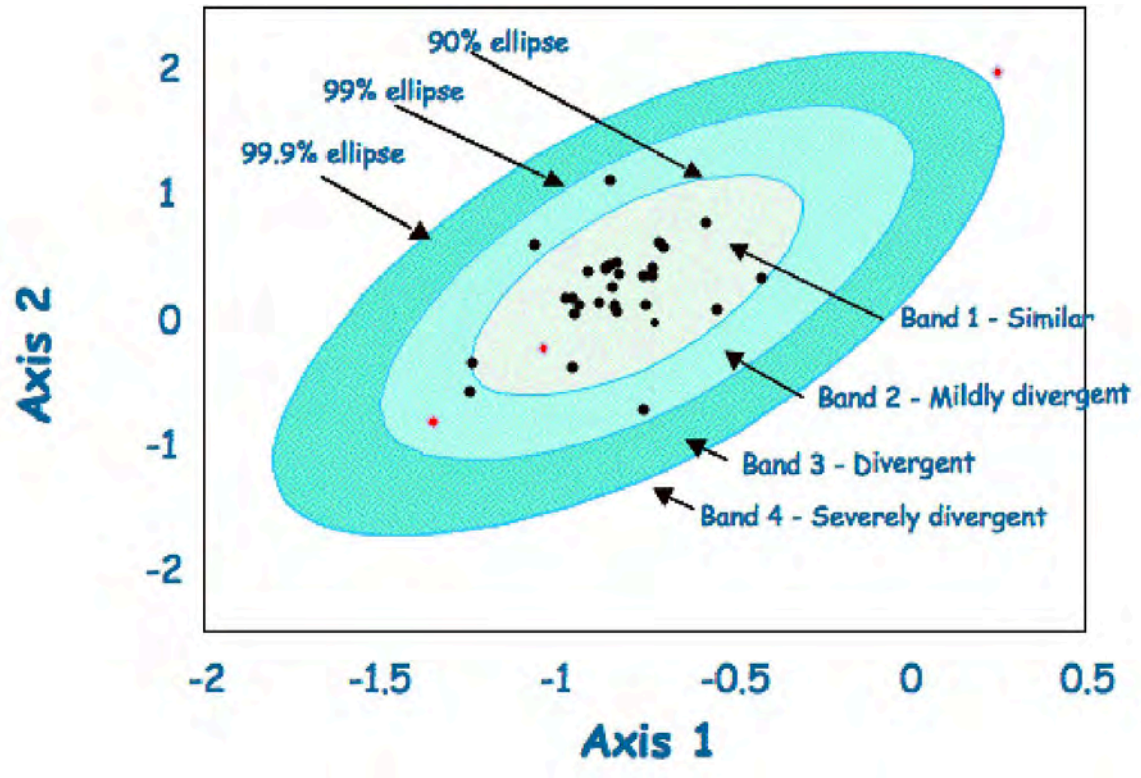
This group of reference sites provides the range of "acceptable" conditions. The further the test site is from the predicted group of reference sites, the more different it is. The assumption of reference condition model is that if a site is different from what is expected, there must be some anthropogenic stress exerted on the benthic community.

BEAST Test site assessment

Ultimately, we are interested in whether or not our test site is in reference condition and if it is not in reference condition (how bad is it?). The degree of deviation from reference condition can indicate the severity of impairment. For this reason we define bands or assessment categories in the ordination plot using probability ellipses (90, 99, 99.9%) around the reference sites only. The farther away the test site is from the centre, the more different it is than expected and therefore more degradation is implied at this test site. The bands of stream condition are as follows …

- Within 90% confidence ellipse = similar or equivalent to reference
- Between 90% and 99% confidence ellipses = mildly divergent from reference as 10% of reference sites could also be here
- Between 99% and 99.9% confidence ellipses = divergent from reference
- Outside of the 99.9% ellipses = highly divergent from reference as this is very different from the reference sites

	Group 1	Group 2	Group	Group 4	Group 5
Test Site	0.01	0.06	0.56	0.14	0.23



CABIN is really the first step in determining the quality or health of a stream. If a problem is detected, CABIN cannot diagnose the problem. CABIN's strength is the ease and wide spread applicability of the screening tool. CABIN does not currently diagnose cause but the information collected (tolerant/intolerant biota, water chemistry) can provide clues as to the possible cause of the degradation (i.e. low dissolved oxygen). As CABIN is used primarily as a screening tool, after a failure or departure from reference condition is detected, a more detailed experiment, study or investigation is often needed to establish the problem and determine the cause.

Procedure - CABIN Data Anomalies

Stephanie Strachan has agreed to be the contact for the Water Quality Monitoring Project if the CABIN model results can't be explained and after the group in question has completed the following procedures …

1. Look at the data to ensure that the prediction makes sense based on …
    a. Their knowledge of the site
    b. The information provided with the reference model data (it can be exported)

2. In other words, groups should be looking at the habitat variables...
    a. If the site was predicted to Group1 which has specific characteristics, does that seem appropriate?
    b. Groups want to be sure some obscure data entry error hasn't happened
    c. Then Groups should see if it was closely predicted to another group. For example 38% predicted to Group 1 and 37% predicted to Group 3
    d. The above condition indicates that the model is having a hard time predicting to a group where the groups overlap in the continuum of biological communities
    e. Groups may wish to produce community ellipses with the other group if they are that close and if that kind of analysis seems more appropriate
    f. They must re-look at the habitat variables again

3. If the habitat data and the prediction seem fine then Groups need to look at the biological data to see why the data is so different than the predicted reference data
    a. For example:
        i. Is it because the reference data have a large diversity and is equally represented by different taxa and the test site had only 2 Taxa?
        ii. Is it because the test site has very large abundances while the reference data does not?
        iii. Is it because the test site does not have any EPT Taxa and the reference sites do?
        iv. Is it because chironomids and worms with few EPT Taxa dominate the test site while the reference sites have more EPT Taxa than chironomids and worms?

4. These are the kinds of things Groups need to look at while also thinking about the potential impacts at the site in question to determine what factors might be contributing to the difference; for example, sedimentation, depleted oxygen, metal contamination.

5. Once all these things have been done and the assessment still does not make sense, Environment Canada is happy to help. At this point the group should compile all their data so it can be e-mailed and contact Stephanie Strachan through the Coordintors.

Running Site Summary Reports for Individual Site Visits

After the data is entered for a site visit, a report can be generated giving a summary of the data collected at that site and date. This report does not include any use of the reference model.

To generate Site Summary Reports:

1. Log-in to the CABIN database
2. Choose Data Management from the sidebar
3. Choose your Study Name, click on the yellow file folder symbol
4. Choose a Site Number from the drop-down menu

5. Choose 'Report' from the sidebar, generating a Site Summary for the site number chosen and for the earliest site visit
6. To choose a different Site Visit Date – Click in the window to the left of the Display button
7. Click 'Display'
8. Click the Back arrow (top left), or the Previous Page button on the left sidebar to return to the Display Site Information page and choose a different Site Number from the drop down menu to generate summaries from the other sites.

Running CABIN Columbia River Model Reports

Once you have data entered in the CABIN database, it is possible to run the data through the Columbia Basin Model to determine if your site(s) are stressed or not. To do this, the Field Sheet, chemistry from the CABIN sampling events, macro-invertebrate, Ice cover and Gradient <30% data must all be entered.

To run the model:

1. Log-in to the CABIN database

2. Choose Analytical Tools from the sidebar

3. Choose 'Create Project'

4. On the Create Project page:
    a. Give your Project a name. Suggestion: name your Project something to describe your overall sites and time frame, e.g. Joseph Cr 2007-2011
    b. Describe Project – description that makes sense to you, e.g., names of the sites, dates covered, or description of scenario, e.g. default
    c. Analytical level – choose Family
    d. Reference model – choose Columbia Okanagan Preliminary March 2010
    e. Test sites – Choose your study, e.g. CBWN-Joseph Cr.
    f. Sites – click on 'Select all' then click on 'Add site'
    g. Choose Confirm Project Creation

5. Choose the project you would like to open in the drop down menu
    a. Choose 'Open Project'

6. Choose 'Create Scenario'

7. On Create Scenario page,
    a. Enter Scenario Name, e.g., Joseph Cr 2007-11Default (Default signals that you are working with Environment Canada's selected default parameters without checking additional ones – recommended)
    b. Enter Scenario Description, e.g. NGJOS01, 02, 03 2007-2011 default
    c. For first project, leave the bolded, default parameters in place and don't add others. The default parameters are needed to run the model and running the model with only these parameters will be a valuable base analysis. Further projects can be created with other parameters, or other scenarios at a later date.
    d. Click 'Confirm Scenario Creation'

8. Click on Classify Test Sites, when check appears next to button,

9. Choose Compare Test Sites
    a. Choose 'Select all'

b. Choose 'Compare Test Sites',

10. Choose 'View Results' (Note you can choose just one, or all consecutively)
    a. Choose Probability & Errors – shows a table of all sites in the Project, placing the sites into the appropriate Group number (Note copy down the group number for future reference) Click Back button
    b. Choose Ordination Summary – shows a table of all sites showing stress level as determined by the model
    c. Choose Community Ellipse – Choose a site & date then choose between the X and Y axis vectors, i.e., vector 1 vs. 2, 1 vs. 3, 2 vs. 3. Click Draw graph after each vector pair choice (Note the simplest way is to choose "1" in the Y-axis box, then Draw Graph; then choose "2" in the Y-axis box and Draw Graph; then choose "3" in the Y-axis box then Draw Graph)
    d. Choose Compare Environmental Variables –
        i. Choose appropriate Group Number – found in the 'Probability & Errors' table
        ii. Choose one of the variables in your data from the drop-down menu
        iii. Click 'Draw Graph' – shows graph of the chosen variable at all sites relative to the Reference. Go 'Back' to choose other variables
    e. Choose Bray-Curtis – shows Bray-Curtis Distance and Reference Mean for all sites/dates in Project
    f. Choose RIVPACS Taxa Ratio – shows all RIVPACS ratios for all sites/dates in Project
    g. (Note To create Macro-Invertebrate statistics, Go to Project Page – Choose 'Metric' button, where you can choose up to five metrics at one time
    h. Click 'Calculate Metrics' at bottom of page – shows table of all sites/dates for the chosen metrics

11. Return to CABIN Data Management page

12. Choose 'Reporting' from sidebar – the Project(s) created in the Analytical Tools will be listed here

13. Click in Project window and choose a listed Project with your cursor.

14. Type a Start Date and End Date (e.g. - Sep 1 2007)

15. Click on Create (on the left sidebar)

16. Select Project in Project window

17. Click on Scenario and all the Sample Sites in your report will appear. Hold down the Control key (Command on MACs) and click each Sample Site you want a report for.

18. Check all Parameter boxes below that you want included in the report.
    (Note click Select All in Habitat Attributes and RIVPACS Analysis windows)

19. Click on Create Report (Note this takes a while)
    One of the Sample Site Reports will pop up after the processing is finished.

20. Click on Return to CABIN data management (left side bar)

21. Click on Reporting and then click on the Search button under the Project window.

22. Scroll through the listed projects until you find your list, which will be highlighted in a different colour. Choose each report you wish to Display. (Note you can save each report as a .pdf file on your computer)

23. Note that all these reports can be found in this way in future

TEMPERATURE

The project uses Onset HOBO Pro v2 Water Temperature Data Loggers. Computers are used through a base station to configure them. Each phase of their operation is explained below.

HOBOware works in both PC and MAC environments, with small variations.

HoboWare - MAC Users Upgrading to OS X 10.7 (Lion)

When you first start HoboWare, you will be asked if you want to check for updates. If you are a MAC user who has recently upgraded to OS X 10.7 (The Lion) you will need to upgrade HoboWare. HoboWare will not work with the MAC Lion operating system unless you upgrade it. Follow the instructions and you should be good to go.

If you try to open a project file and you get a message that OS X 10.7 does not support PowerPC, use the following method to upgrade:

A second way to upgrade HoboWare so it will work on MAC OS X – The Lion is:
Download the latest version of the HOBOware Pro Free Trial from the Onset website:
http://www.onsetcomp.com/products/software

Once you have this trial version installed and opened, follow the link in the top tab to: Help Manage License Key

Enter the 16-digit code (with dashes) that can be found on your old CD-package or under the Manage License Key tab of any older computers' version of HOBOware you may still have available. Once the license key is inputted, close the program and re-open it; it should be good to go from there.

Onset has HOBOware available for all of the newest versions of Mac and Windows platforms.

Anchoring Loggers

Choose a site that will not dry out in summer months. Pools below rocks, or logs work well. If the site is in a public place, the logger should be camouflaged well.

A common way of anchoring is to attach the logger in a 2" plastic pipe 10" long with pipe, or 1" rebar attached to keep it submerged. The pipe is then secured to a tie point using rope or cable. If the stream is fast moving, it is best to secure the pipe holding the logger with chain.

In larger, stronger rivers, it may be necessary to use an even more robust system, such as the rebar/rock-bolt system used by Environment Canada. To avoid vandalism, EC tries to install the loggers near the middle of the river so they are not easily accessed from the shore.

1. First, a large rock is found to secure the re-bar to.
2. The rebar is pounded into the streambed then two holes are drilled into the rock using a hammer drill with a 3/8" drill bit and inserting 3/8" rock bolts into the holes.
3. Stainless steel anchors are then slipped onto the rebar and then tightened onto the rock bolts with stainless steel nuts to hold the rebar in place.
4. Stainless steel hose clamps are then used to secure the logger to the rebar with a cable

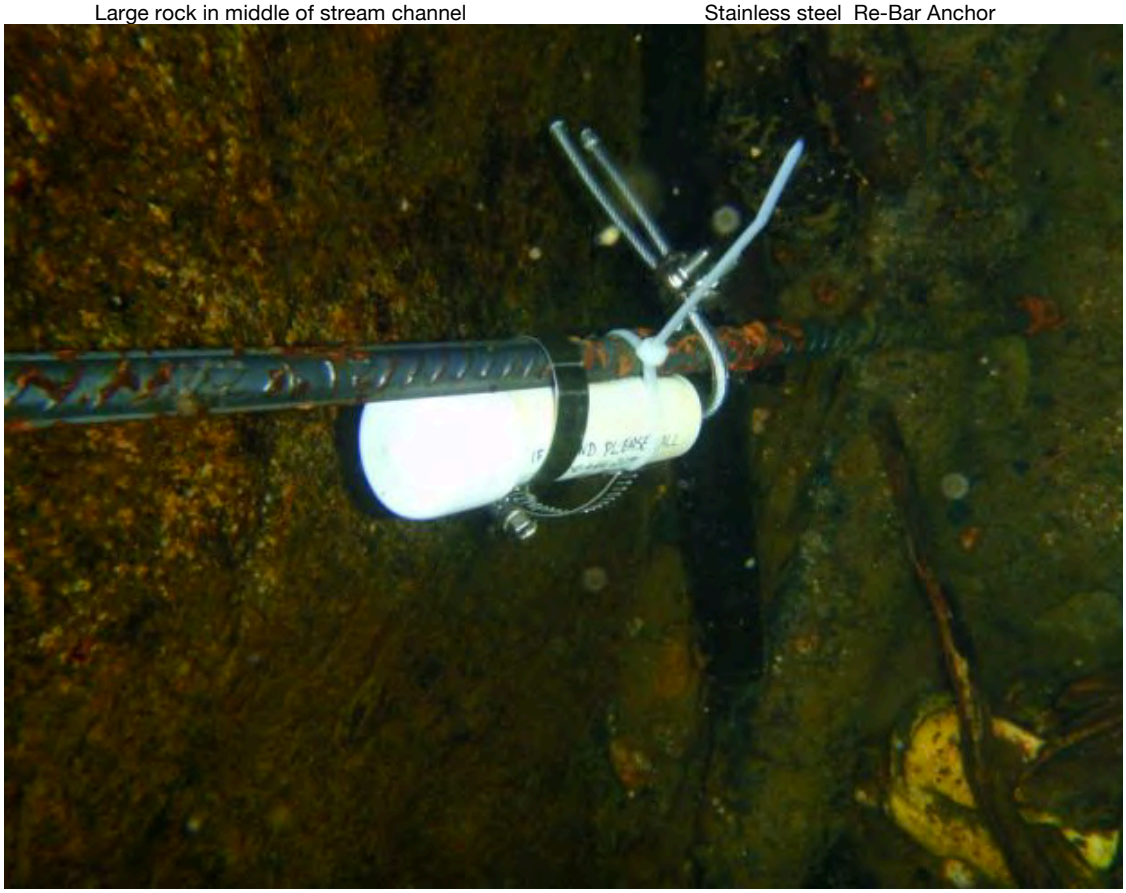
attached as a back up.

5. The logger can be secured inside a length of PVC pipe, as described above, or, if the river system is not very hydrologically active, a rubber boot can be purchased to protect the logger.
6. In areas frequented by people, EC attaches a custom stainless steel tag that indicates its temperature monitoring equipment and giving contact information.

Please see the accompanying photos.

Large rock in middle of stream channel

Stainless steel Re-Bar Anchor



Logger attached to Re-Bar with stainless steel clamp

HoboWare

The HOBOware program has a Help function. Click Help and then choose '? HOBOware Help' As well as having categories to click on, two manuals can be downloaded, "HOBOware User's Guide" and "Getting Started Using HOBOware". The "HOBOware User's Guide" is more extensive.

Readout Data From Temperature Logger

1. Open the HOBOware program (decline 'looking for software updates')
2. Plug the Basestation into a USB slot
3. Note down the logger serial # and Site # that you wish to readout
4. Insert the logger into the Basestation shuttle (ensure it seats all the way in)
5. Push the lever on the side of the Basestation to initialize the logger (for later model shuttles)
6. Click on Device (top toolbar)
7. Choose Readout (** Note – if you choose Launch, you will permanently erase the logger data)
8. Save the datafile (raw data) to the HOBOware folder (which is the default) by:
    a. Click on Save
    b. Change default name to serial # of logger, Site Code, date range (e.g. 1192031-NGJOS03-May-Oct 2010)
9. Click Save… "Plot Setup" appears
10. In Plot Setup…
    a. Change the title to
        i. Logger serial #
        ii. Site Code
        iii. Date range
        iv. Example - 1192031-NGJOS03-May-Oct 2010
    b. Ensure the temperature is in Celsius C°
    c. Undo check for 'Show Battery' – or leave the checkbox blank
    d. Click on 'None' to remove the default checks on:
        i. Coupler attach
        ii. Post connected
        iii. Stop
        iv. End of file (*there should be no checks)
    e. Offset from GM (Greenwich Meridian) should read -6 in East Kootenay or -7 in West Kootenay
11. Click Plot

A screen appears showing the temperature graph for the time period of the logger readout.

- The upper portion of the screen is the Points Pane (which contains all the temperature data from this readout)
- The left-hand panel is called the Details Pane

Option

You can move the cursor to the left border of the graph click and drag the left border over to the left side of the screen so that the graph is full-screen. *Note: this covers the Detail Pane, which lists the Series shown on the graph.

Crop Unwanted Data From the Graph

Likely you launched the logger from home and there was a delay getting the logger into the water. This causes a spike in the temperature that is not useful data.

When you remove the logger from the stream the time from removal to readout will cause a temperature spike. It is smart to remove this extraneous data before saving the graph as a project. Remember that the original save was the Data File, which cannot be changed *(it is the raw data, that you will likely want to go back to in its original state, in future)*.

Cropping

1. After you plot the graph, observe if there are temperature spikes at either end
2. Click on the points pane and scroll to the date and time the spike ends at the start and begins at the end and note these dates and times
3. Move the cursor to the graph and right click
4. Choose "Crop Series"
5. In the popup, click on the Start Date window until you see the date of the spike end
6. Choose the appropriate Start Time
7. Repeat this procedure to remove extraneous temperature spike at the End Time
8. Click Crop

Save Project

A project is a modified Data File. You can have different projects associated with the same Data File.

1. Click on File, then Save Project
2. Name the (.hproj) file using the Site Code and date range (e. g. NGJOS-04_Sep-Nov'07)
3. Choose your Hoboware folder and/or appropriate sub-folder and click Save

Send Files To Coordinators

1. Open your e-mail program
2. Send a message to Jim jim.duncan9@me.com titled Water Temperature Data from group name
3. Attach the Data File (.hobo) and the Project File (.hproj)
4. Send to Jim
5. *Note – If you are having trouble saving the Project File, it is possible to send only the Data File

Plotting Maximum Daily, Minimum Daily, Average Daily Temperatures

1. Click on the series, either on the graph or in the details pane
2. Go to Edit on the toolbar and choose Filter Series or click on the filter icon
3. Choose either Maximum Temp, Minimum Temp or Average Temp and choose a frequency
4. Name the series (e.g., Max: Temp NGJOS-01 2010), this will be the name on the legend for this series
5. Click OK
6. Highlight 'Series: Temp'
7. Go to Edit on toolbar and choose 'Remove Series: Temp'
8. Plot will then show the filtered graph
9. Save Project as described above

Plotting Different Files Into One Plot

(For example, to place the temperature data from 2 different sites on one graph.)

1. Open the two or more data files or project files that you would like to place on one graph
2. Choose which datafile or project file to be the destination plot – this is where all the series will end up in one graph
3. Open the other file (source file) and select the series you want to copy
4. Right-click and choose Copy Series from the pop-up menu

5. Open the destination file and right click anywhere on the destination plot, choose Paste Series from the pop-up menu
6. The new series is added to the graph, Details Pane and Points Pane
7. Repeat this process to add other series to the graph
8. Save as a project with a descriptive name
9. If the series being compared have different time frames, some adjustments need to be made to the plot

Merging Multiple Data Files

(This is useful to join measurements that have a gap of time in the data.) For instance, if the data from a site was downloaded on Jun 15 and then the logger was re-launched on July 1, you can merge the data from the different downloads into one graph

1. Open the oldest file
2. Go to File menu and choose Merge Datafiles
3. Select the datafiles you want to merge from the window
4. Click OPEN
5. The graphs will merge, showing a straight line joining the oldest sample to the later one
6. Save as a project

Modifying the Plot

(Modifying a graph by adding a title, legend and labels. The graph line(s) can also be changed in form, colour and width.)

Title: When downloading a logger or opening a datafile, a Plot Set-up window opens. The Description entry becomes the title of the plot. This title can be modified by changing the entry in the Description box or by double clicking the title on the plot and making the change on the window that opens. The font and location on the plot can also be changed.

Labels: The label is attached to a series (i. e. a line of the graph). To add a label, right click the graph and choose Add Graph Label. Make the choices given on the pop-up window. Or, click the Graph Label icon. To change the size and colour of a label, right click on the label and make the choices available there. Or, right click on the label and choose Label “xxx” Properties, then make the choices available

Legend: Double-click an empty space on the graph to open a pop-up that allows you to hide or show the legend. If more that one series has been plotted on the graph, the name of the series that is added to the destination file becomes the name of the legend

Series graph lines: Double left click on a series graph line to open a pop-up window, make the choices available. Or, choose a series in the details pane then click the Properties icon, make the choices available. Or, choose a series in the details pane then click on Graph Properties under the Edit menu

Custom Printing: Click on the printer icon, or click Print under the File menu. Click the General button and then click on Page Set-up to make choices in orientation, page size. Note** if choices are not made via Page Set-up, the default print will be in Portrait and A4 paper size.

Exporting details text

Export the information in the Details pane to a text file. To export details:

1. Make sure the Details pane includes the series you want to export. This might include series pasted from other datafiles, or series derived through filters.
2. From the File menu, select Export Details
3. Accept the default file name, or type a new name and click Save

Details are exported to a .txt file, which can be opened in any text editor, or imported into many other types of programs (word processors, spreadsheets, etc.).

Exporting Points

Export the points shown in the Points pane to a text file (.csv) for importing into Microsoft Excel. To export points:

1. Make sure the Points pane includes the series you want to export. This might include series pasted from other datafiles, or series derived through filters.
2. Click the Export icon on the toolbar, or choose **Export as Excel Text** from the File menu. The Export Options dialog will display.
3. To export all of the data in a single file, choose **Export to a single file** and click **Export**. In the Save dialog, accept the default location and file name, or enter a new location and name and click **Save**.
4. To split the data over multiple files (particularly important if your data cannot fit in a single spreadsheet), choose **Export to multiple files** and make your selections.
    a. Indicate the maximum **Number of rows per file**. Consult the documentation that came with your spreadsheet program to find out the maximum number of rows it accepts, and remember to leave room for header rows.
    b. Accept the default **Export Location**, or click **Choose** to use a different location. (The default location creates a new folder for the files.)
    c. Accept the default **Filename Prefix** (based on the datafile name), or enter a new one. The export file names will consist of this text plus "_PageX", where X indicates the order of the files.
    d. Click **Export**
5. Open the file(s) in Excel. You can easily view the raw data in a text editor.

*Tip: To change the year format, the time format, column separators, or include serial numbers in the export file, go to the HoboWare menu and choose **Preferences**. Year and date format controls are located on the **Display** pane. Column separators (delimiters) and serial number options are located under the **Export Settings** group on the **General** pane.*

In Excel, dates and times for each data point may initially appear as ##########. Times also may not have seconds listed. To display the full date and time with seconds in Excel:

1. Adjust the time column so you can see the whole date and time
2. Select the time column from row 3 down
3. From the Format menu, click **Cells**
4. Select the **Custom** category and then select **m/d/yyyy h:mm** as the type
5. Add ".ss" to the end of the string on the Type field: m/d/*yyyy h: mm:ss*
6. Click **OK** – The seconds should be listed automatically

*Tip: You can export the data and time in separate columns. From the File menu, choose **Preferences**. Go to the **General** pane and enable the "Date and time format: Separate into two columns" preference in the **Export Settings** group.*

Monthly Monitoring Quarterly Wage & Expense Claims

Name			
Watershed Group			

CABIN WAGE CLAIM

Date	Name	Details	Cost
		Total	$0.00

Sampler #1	Address
Sampler #2	**Address**

MILEAGE EXPENSE - CABIN MONITORING

DATE	ACTIVITY	KILOMETERS	X $.50
		TOTAL MILEAGE CLAIM	$0.00

SHIPPING EXPENSE - CABIN MONITORING

DATE	CABIN or MONTHLY	CARRIER	COST
		TOTAL SHIPPING CLAIM	$0.00
		Receipt attached?	

SUPPLIES REIMBURSEMENT

DATE	DETAILS	COST
	TOTAL COST	$0.00
	Receipt attached?	

Total Wage Sampler #1	
Total Wage Sampler #2	
Total Mileage Sampler #1	
Total Mileage Sampler #2	
Total Shipping Sampler #1	
Total Shipping Sampler #2	
Total Claim Sampler #1	
Total Claim Sampler #2	

Signiture of person submitting

Date

E:mail jim.duncan9@me.com
Mail: 436 Fortier Street
Kimberley, BC V1A 1N6

Approved for payment

Date

CABIN Monitoring Wage & Expense Claims

Name			
Watershed Group			

CABIN WAGE CLAIM

Date	Name	Details	Cost
		Total	$0.00

Sampler #1	Address
Sampler #2	**Address**

MILEAGE EXPENSE - CABIN MONITORING

DATE	ACTIVITY	KILOMETERS	X $.50
		TOTAL MILEAGE CLAIM	$0.00

SHIPPING EXPENSE - CABIN MONITORING

DATE	CABIN or MONTHLY	CARRIER	COST
		TOTAL SHIPPING CLAIM	$0.00
		Receipt attached?	

SUPPLIES REIMBURSEMENT

DATE	DETAILS	COST
	TOTAL COST	$0.00
	Receipt attached?	

Total Wage Sampler #1	
Total Wage Sampler #2	
Total Mileage Sampler #1	
Total Mileage Sampler #2	
Total Shipping Sampler #1	
Total Shipping Sampler #2	
Total Claim Sampler #1	
Total Claim Sampler #2	

Signiture of person submitting

Date

E:mail jim.duncan9@me.com
Mail: 436 Fortier Street
Kimberley, BC V1A 1N6

Approved for payment

Date

Data Handling Wage Claim

$600 is allocated to each Watershed Group for Data Handling
$400 paid upon correct CABIN data entry for 3 sites
$100 paid upon receipt of Hobo water temperature data in correct format
$100 paid upon receipt of all Monthly Meter Readings forms completed correctly

Watershed Group: _____ Date: _____

Data Handler: _____

Mailing Address: _____

Tasks completed:

Approved entry habitat information in Environment Canada database for 3 sites	$400	
E-mailed temperature data to coordinators	$100	
Monthly meter readings to coordinators (check appropriate months)	$100	
December		
January		
February		
March		
April		
May		
June		
July		
August		
September		
October		
November		

Comments _____

Tasks above completed (Data handler) _____ Signature

Remitted	$400 fpr CABIN data entry	(Date)	
	$100 for Temperature data	(Date)	
	$100 for Monthly Meter Readings	(Date)	

Coordinator: _____

Travel Claim – Water Quality Monitoring Project

Watershed Group			

Claiment #1	Address
Claiment #2	**Address**

MILEAGE EXPENSE - CABIN MONITORING

DATE	ACTIVITY	KILOMETERS	X $.50
		TOTAL MILEAGE CLAIM	$0.00

MEAL EXPENSES

DATE	DETAILS	COST
	TOTAL MEAL CLAIM #1	
	Receipts attached?	
	TOTAL MEAL CLAIM #2	
	Receipts attached?	

HOTEL EXPENSES

DATE	DETAILS	COST
	TOTAL HOTEL CLAIM #1	
	Receipts attached?	
	TOTAL HOTEL CLAIM #2	
	Receipts attached?	

Total Claim #1	
Total Claim #2	
Total Claims	

Signiture of person submitting

Date

E:mail jim.duncan9@me.com
Mail: 436 Fortier Street
Kimberley, BC V1A 1N6

Approved for payment

Date

STEERING COMMITTEE TERMS OF REFERENCE

Background

The Water Quality Monitoring Project was developed in response to requests from participants at the May 2005 Columbia Basin Watershed Network Symposium and the September 2006 Water Quality Monitoring Workshop. In 2007, the Columbia Basin Water Quality Monitoring Project was initiated to establish a network of community-based watershed groups with the capacity to collect water quality data over the long term. The first four groups in the project were Slocan River Streamkeepers (Slocan River), Salmo Watershed Streamkeepers Society (Salmo River), Mainstreams (Joseph Creek, Cranbrook) and Mark Creek Recovery Program (Kimberley Creek, Kimberley). They agreed to monitor the health of local streams and rivers using the Canadian Aquatic Biomonitoring Network (CABIN) protocol.

In year three, four new groups were added; Wildsight Golden (Horse and Ventego Creeks), Wildsight Invermere (Windermere Creek) Arrow Lakes Environmental Stewardship Society (Burton and Snow Creeks), and Friends of the Lardeau River (Lardeau River) for a total of eight groups. In Year 4, the Mark Creek Recovery Program dropped out of the program and was replaced by the Saint Mary Rural Resident's Association (St. Mary River).

As a result of evaluation and reflection on previous years, a Water Quality Monitoring Steering Committee has been formed to help articulate regional goals and objectives and strategies to achieve these. The Water Quality Monitoring Project Steering Committee is a sub committee of the Columbia Basin Watershed Network (for more information on the Columbia Basin Watershed Network see the Strategic Framework and Priorities, 2008).

Funding and/or in-kind contributions or commitments have been provided by Columbia Basin Trust, Environment Canada, and BC Ministry of Environment - In-kind and volunteer contributions and commitments have been provided by all the participating community groups

The Goals of the Project are to:

1. Develop a model for long-term community based water quality monitoring
2. Establish access to the resulting water quality data through web technology
3. Provide water quality data to Basin residents in a user friendly format

Purpose

The Steering Committee (SC) for the Water Quality Monitoring Project provides strategic advice and guidance to CBT on the project's direction.

SC Roles and Responsibilities

- The Steering Committee will determine a program management and evaluation mechanism to assess performance to date and to provide guidance for activities past year 3.
- SC members will provide advice to CBT related to the planning and future direction of the project, and CBT will provide direction to the Project Coordinator.
- The SC Chair, as a representative of the SC, will provide advice to the Project Coordinator on the planning and implementation of the project.
- The SC will provide advice to CBT on the feasibility of developing a comprehensive picture of the relative water quality and watershed health in the Columbia Basin
- Assess methods to create a more cohesive regional approach for the project

- SC members will communicate with their respective groups or agencies to act as conduits of information discussed at meetings/teleconferences and to ensure that the SC are aware of each constituents' priorities, concerns, etc.
- Ensure program goals and objectives are developed as necessary to guide the project
- Provide strategic approaches to ensure program implementation is comprehensive and cost effective.

Specific Steering Committee Tasks

- Participate in meetings or teleconferences once every two months (or appoint an alternate).
- Provide timely feedback, as required to CBT and the Project Coordinator
- Share relevant knowledge, experience and feedback with CBT and the Project Coordinator

Term and Financing

- 12-month commitment from October 2009 to September 2010.
- The SC is a volunteer group.
- CBT will cover travel, accommodation and meal expenses, if needed, when incurred for in-person meetings or workshops.

Decisions

- The SC will make decisions by consensus where possible.
- SC members will be responsible to make decisions and recommendations on behalf of their respective groups or agencies.
- Decisions will require participation of a minimum of 60% of the SC members.
- There may be more than one approach to solving a single problem. The SC may choose to incorporate multiple approaches in some instances.
- In the event consensus is not possible, the conflicting arguments will be recorded. SC members may request to defer a decision by up to 2 weeks.
- If consensus is not possible, a majority (50%+1 of discussion participants) decision will be accepted.
- The SC will be given one week, unless otherwise stated, to comment on documents by email. If there is no response, it is assumed there are no comments.

Steering Committee Chair

- The SC Chair may be the Columbia Basin Watershed Network Coordinator or a representative of one of the watershed groups.
- The position of Chair will occur though a vote.
- The SC Chair will call meetings, receive agenda items, develop and distribute agendas, take, file and distribute minutes, and ensure the Rules of Conduct are followed.
- The SC Chair will disseminate information on the WQM Program and liaise with the Columbia Basin Watershed Network SC
- The SC Chair as a representative of the SC will liaise with and provide advice to the Project Coordinator
- The SC Chair will provide a tie-breaking vote if necessary

Rules of Conduct

- The SC members will treat one another respectfully
- The SC members will respect differing opinions
- The SC members will maintain an open mind
- The SC will work collaboratively to move the work of the SC and the Water Quality Monitoring Project forward
- If SC members do not follow the Rules of Conduct or adhere to the Roles and Responsibilities, the SC Chair in consultation with the CBT Program Manager, Water Initiatives will ask the SC member to withdraw from either the SC or subcommittees.

Structure and Membership

- The SC includes individuals with a range of technical, community and government expertise.
- Each participating watershed group will designate an alternate who will only participate in teleconferences as needed, but will receive all SC communications so that they will be cognizant of and up to date on SC work.
- The SC includes advisors (federal and provincial representation and technical experts), CBT representatives and Water Quality Monitoring member groups.
- Advisors (Environment Canada, Ministry of Environment, technical experts, etc) will provide recommendations, but not participate in decisions
- The Columbia Basin Trust Program Manager, Water Initiatives will sit on the Steering Committee as an ex officio member
- The Water Quality Monitoring Project Coordinator will sit on the Steering Committee as an ex officio member
- Additional SC members may be invited to participate in the future to fill knowledge gaps in SC expertise and experience
- In consultation with the Watershed Network SC, Sub-committees may be struck by the SC Chair and the SC to work on specific issues or tasks within the project

ONLINE RESOURCES

CABIN DOCUMENTS

CABIN (Canadian Aquatic Biomonitoring Network website is at: http://ec.gc.ca/rcba-cabin/default.asp?lang=En&n=72AD8D96-1

CABIN Field Sheets
The most recent field sheets can be found on the CABIN website at http://ec.gc.ca/rcba-cabin/74876ADD-8158-49CD-94E3-FC21D5A2C2E7/CABIN%20FieldSheet%20EN%202011.pdf

CABIN Wadeable Streams Field Manual can be found on the CABIN website at: http://www.ec.gc.ca/Publications/C183563B-CF3E-42E3-9A9E-F7CC856219E1/CABINFieldManual.pdf

ECOANALYSTS

EcoAnalysts Inc. Chain of Custody form:
http://www.ecoanalysts.com/sample.php

EcoAnalysts Inc. Life in Water website:
www.ecoanalysts.com

MAPPING

GPS Latitude and Longitude Converter
http://www.csgnetwork.com/gpscoordconv.html

Topographic Maps – find dealers at:
http://maps.nrcan.gc.ca/distribution_e.php

MINISTRY OF ENVIRONMENT

British Columbia Field Sampling Manual: 2003 – For Continuous Monitoring and the Collection of Air, Air-Emission, Water, Wastewater, Soil, Sediment and Biological Samples
http://www.env.gov.bc.ca/epd/wamr/labsys/field_man_03.html

PROJECT METER MANUALS

Hach Dissolved Oxygen kit http://www.hach.com/dissolved-oxygen-test-kit-model-ox-2p/product-downloads?id=7640219538

Hach 2100QTurbidimeter http://www.hach.com/2100q-portable-turbidimeter/product-downloads?id=7640450963 Choose 2100 Qis Full User Manual, English

YSI 30 Salinity, Conductivity and Temperature Meter
http://www.ysi.com/media/pdfs/030136-YSI-Model-30-Operations-Manual-RevE.pdf

Oakton pH Testr 30 http://www.4oakton.com/Manuals/pHORPIon/pHTestr3_3+mnl.pdf

RELATED ORGANIZATIONS

POLIS Project on Ecological Governance
http://www.polisproject.org/

POLIS Project Water Sustainability Project
http://www.poliswaterproject.org/

STANDARDS

Integrated Land Management Bureau: Resource Information Standards Committee, Aquatic Ecosystem:
http://www.ilmb.gov.bc.ca/risc/pubs/aquatic/index.htm
Click on:
BC Guidelines for Interpreting Water Quality Data

BC Approved Water Quality Guidelines 2006 Edition
http://www.env.gov.bc.ca/wat/wq/BCguidelines/approv_wq_guide/approved.html
drinking water, recreational, aquatic life, wildlife water supply, livestock water supply, marine & estuarine aquatic life

BC Working Water Quality Guidelines
http://www.env.gov.bc.ca/wat/wq/BCguidelines/working.html
Table 1: Working Guidelines for the Water Column

BC Water Quality Guidelines (Criteria) Report;
http://www.env.gov.bc.ca/wat/wq/wq_guidelines.html

BC Working Guidelines for Sediment
http://www.env.gov.bc.ca/wat/wq/BCguidelines/working.html
Table 2: Working Guidelines for the Sediment

Canadian Sediment Quality Guidelines for the Protection of Aquatic Life
http://ceqg-rcqe.ccme.ca/
Click on 'Expand this section of 'Canadian Sediment Quality Guidelines for the Protection of Aquatic Life

Canadian Water Quality Guidelines for the Protection of Aquatic Life
http://ceqg-rcqe.ccme.ca/
Click the 'Open' tab beside the title 'Canadian Water Quality Guidelines for the Protection **of Aquatic Life'**

Guidelines for Canadian Drinking Water Quality – Summary Table
http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/sum_guide-res_recom/index-eng.php

Guidelines for Canadian Recreational Water Quality
http://www.hc-sc.gc.ca/ewh-semt/pubs/water-eau/guide_water-1992-guide_eau/index-eng.php

MAXXAM REGULAR MONTHLY COC (Filled out)

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Maxxam Analytics International Corporation o/a Maxxam Analytics
4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free:(604) 734 7276 Fax:(604) 731 2386 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page of

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:		Laboratory Use Only:	
Company Name:	#3401 MAINSTREAMS	Company Name:	#5659 MAINSTREAMS (Formerly KRN-BC)	Quotation #:	A70528	MAXXAM JOB #:	BOTTLE ORDER #: 259165
Contact Name:	LAURA DUNCAN	Contact Name:	LAURA DUNCAN	P.O. #:			
Address:	MAINSTREAMS c/o LAURA DUNCAN 436 FORTIE KIMBERLEY BC V1A 1N6	Address:	c/o LAURA DUNCAN 436 FORTIER STREET. KIMBERLY BC V1A 1N6	Project #:	Columbia Basin WQMP 2012	CHAIN OF CUSTODY #: C#259165-02-01	PROJECT MANAGER: TABITHA RUDKIN
Phone:	(250)427-2600 Fax:	Phone:	(250)427-2600 Fax:	Project Name:	Slocan R NJSL001		
Email:	GARDENLAURA@SHAW.CA	Email:	GARDENLAURA@SHAW.CA	Site #:			
				Sampled By:	S. Bennett		

REGULATORY CRITERIA:

SPECIAL INSTRUCTIONS

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

SAMPLES MUST BE KEPT COOL (< 10°C) FROM TIME OF SAMPLING UNTIL DELIVERY TO MAXXAM

ANALYSIS REQUESTED (Please be specific):

TURNAROUND TIME (TAT) REQUIRED:

PLEASE PROVIDE ADVANCE NOTICE FOR RUSH PROJECTS

Regular (Standard) TAT:
(will be applied if Rush TAT is not specified):
Standard TAT = 5-7 Working days for most tests.
Please note: Standard TAT for certain tests such as BOD and Dioxins/Furans are > 5 days - contact your Project Manager for details.

Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Alk, NO2, NO3, Ortho-Phosphate	# of Bottles	Comments
1		NJSL001	Feb 18 2012	10:30 PST	H_2O	N	N	✓	1	Air temp -2°C
2										Water temp +4°C
3										Weather: sunny,
4										steady breeze,
5										5cm snowfall 2
6										days ago
7										
8										cc: shanoon of the forest @xplornet.com
9										passlab @xplornet.com
10										

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted	Laboratory Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
S Bennett S Bennett	12/02/18	11:30 PST				0	☐		☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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4606 Canada Way, Burnaby, British Columbia Canada V5G 1K5 Tel:(604) 734 7276 Toll-free:(604) 734 7276 Fax:(604) 731 2386 www.maxxam.ca

CHAIN OF CUSTODY RECORD

Page of

INVOICE INFORMATION:		REPORT INFORMATION (if differs from invoice):		PROJECT INFORMATION:	
Company Name:	#3401 MAINSTREAMS	Company Name:	#5659 MAINSTREAMS (Formerly KRN-BC)	Quotation #:	A70528
Contact Name:	LAURA DUNCAN	Contact Name:	LAURA DUNCAN	P.O. #:	
Address:	MAINSTREAMS c/o LAURA DUNCAN 436 FORTIE	Address:	c/o LAURA DUNCAN 436 FORTIER STREET.	Project #:	Columbia Basin WQMP 2012
	KIMBERLEY BC V1A 1N6		KIMBERLY BC V1A 1N6	Project Name:	Joseph Cr NG JOS03
Phone:	(250)427-2600 Fax:	Phone:	(250)427-2600 Fax:	Site #:	
Email:	GARDENLAURA@SHAW.CA	Email:	GARDENLAURA@SHAW.CA	Sampled By:	L Duncan

Laboratory Use Only:

MAXXAM JOB #:	BOTTLE ORDER #:
	259165
CHAIN OF CUSTODY #:	**PROJECT MANAGER:**
C#259165-01-01	TABITHA RUDKIN

REGULATORY CRITERIA:

SPECIAL INSTRUCTIONS

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Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Alk, NO2, NO3, Ortho-Phosphate	Conductance, Turbidity, pH	# of Bottles	Comments
1		NGJOS01 - Sample1	July 26 2014	9:20 MDT	H_2O	N	N	✓		1	Air temp 18°
2		NGJOS01 - Sample2 Repl.	July 26 2014	9:20 MDT	H_2O	N	N	✓	✓	2	Water temp 10°
3		NGJOS01 Sample3 Blank	July 26 2014	9:20 MDT	H_2O	N	N	✓	✓	1	
4											Weather - Sunny, warm
5											showers overnight
6											
7											
8											
9											
10											

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted
L Duncan	14/07/26	10:30 MDT				0
L Duncan						

Laboratory Use Only		
Time Sensitive ☐	Temperature (°C) on Receipt	Custody Seal Intact on Cooler? ☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS.

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Contact Name:	LAURA DUNCAN	Contact Name:	LAURA DUNCAN	P.O. #:			
Address:	MAINSTREAMS c/o LAURA DUNCAN 436 FORTIE KIMBERLEY BC V1A 1N6	Address:	c/o LAURA DUNCAN 436 FORTIER STREET. KIMBERLY BC V1A 1N6	Project #:	Columbia Basin WQMP 2012	CHAIN OF CUSTODY #:	PROJECT MANAGER:
Phone:	(250)427-2600 Fax:	Phone:	(250)427-2600 Fax:	Project Name:	Windermere Cr	C#259165-01-01	TABITHA RUDKIN
Email:	GARDENLAURA@SHAW.CA	Email:	GARDENLAURA@SHAW.CA	Site #:	NAWIN03		
				Sampled By:	A. Leschied		

REGULATORY CRITERIA:

SPECIAL INSTRUCTIONS

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Job Specific Rush TAT (if applies to entire submission)
Date Required: _____ Time Required: _____
Rush Confirmation Number: _____ *(call lab for #)*

	Sample Barcode Label	Sample (Location) Identification	Date Sampled	Time Sampled	Matrix	Regulated Drinking Water ? (Y/N)	Metals Field Filtered ? (Y/N)	Alk, NO2, NO3, Ortho-Phosphate	Metals, CCME	# of Bottles	Comments
1		NAWIN03	Sep 20/11	10:00 MST	H_2O	N	N	✓		1	Air 8.5°C Water 7.5°C
2		NAWIN02	Sep 20 2011	12:00 MST	H_2O	N	N	✓		1	Air 10°C Water 11°C
3		NAWIN01	Sep 20 2011	14:00 MST	H_2O	N	N	✓		1	Air 10°C Water 11°C
4		NAWIN03	Sep 20 2011	10:00 MST	SOIL	N	N		✓	1	Air 8.5°C Water 7.5°C
5											
6											Weather: cloudy, cool
7											rain overnight
8											
9											cc: heather@wildsight.ca
10											

Note: For regulated drinking water samples - please use the Drinking Water Chain of Custody Form

*RELINQUISHED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	RECEIVED BY: (Signature/Print)	Date: (YY/MM/DD)	Time:	# Jars Used and Not Submitted	Laboratory Use Only: Time Sensitive	Temperature (°C) on Receipt	Custody Seal Intact on Cooler?
H. Leschied	11/09/20	14:30				0	☐		☐ Yes ☐ No

* IT IS THE RESPONSIBILITY OF THE RELINQUISHER TO ENSURE THE ACCURACY OF THE CHAIN OF CUSTODY RECORD. AN INCOMPLETE CHAIN OF CUSTODY MAY RESULT IN ANALYTICAL TAT DELAYS

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EcoAnalysts, Inc.
1420 S. Blaine St., Suite 14
Moscow, ID 83843
(208) 882-2588

EcoAnalysts Project# :	*(EcoA use)*
Company:	**Salmo Watershed Streakeeper Society**
Total # of Samples this project:	**3**
# of Samples Shipped this shipment:	**3**

	#of Containers	Stream	Site #	Rep	Device Type	Device Dimensions	Habitat	Collection Date	Notes
1	2 jars	Salmo R	NESLM01		kick	*N/A*	*Riffle*	09/23/11	95% ethyl alcohol
2	1 jar	Salmo R	NESLM02		kick	*N/A*	*Riffle*	09/23/11	95% ethyl alcohol
3	3 jars	Salmo R	NESLM03		kick	*N/A*	*Riffle*	09/23/11	95% ethyl alcohol
4									
5									
6									
7									
8									
9									
10									
etc.									
Insert more rows here.									

Relinquished By Carrie Nichols Oct 25, 2011 **Condition:** Good

Company: Salmo Watershed Streamkeeper Society

Received By/ Date: **Condition:**

Company:

Relinquished By/ Date: **Condition:**

Company:

Received By/ Date: **Condition:**

Company:

Relinquished By/ Date: **Condition:**

Company:

Received By/ Date: **Condition:**

Company:

Feel free to customize anything on this spreadsheet to fit your needs. Please include a signed copy with shipment as well as sending an e-mail version to smcgraw@ecoanalysts.com. Thank you!

MAXXAM SAMPLE JAR LABELS

MONTHLY MONITORING LABEL

SAMPLE I.D.: NAWIN03
COMPANY NAME: Wildsight Invermere
PROJECT REFERENCE: CBWQM
DATE: Mar 18, 2012
TIME: 9:45am MDT
ANALYSIS: Alk, NO_2/NO_3, Ortho-phos
PRESERVATIVE: N/A
Maxxam
Success Through Science

QA/QC LABELS

SAMPLE I.D.: NAWIN 03 Sample 1 Regular
COMPANY NAME: Wildsight Invermere
PROJECT REFERENCE: CBWQM
DATE: May 18, 2012
TIME: 09:30am MDT
ANALYSIS: Alk, NO_2/NO_3, Ortho-phosphate
PRESERVATIVE: N/A
Maxxam
Success Through Science

SAMPLE I.D.: NAWIN 03 Sample 2 Replicate
COMPANY NAME: Wildsight Invermere
PROJECT REFERENCE: CBWQM
DATE: May 18, 2012
TIME: 09:30am MDT
ANALYSIS: pH, SpCond, Alk
PRESERVATIVE: N/A
Maxxam
Success Through Science

SAMPLE I.D.: NAWIN 03 Sample 2 Replicate
COMPANY NAME: Wildsight Invermere
PROJECT REFERENCE: CBWQM
DATE: May 18, 2012
TIME: 09:30am MDT
ANALYSIS: Turb, NO_2/NO_3, Ortho-phosphate
PRESERVATIVE: N/A
Maxxam
Success Through Science

SAMPLE I.D.: NAWIN 03 Sample 3 Blank
COMPANY NAME: Wildsight Invermere
PROJECT REFERENCE: CBWQM
DATE: May 18, 2012
TIME: 09:30am MDT
ANALYSIS: Alk, NO_2/NO_3, Ortho-phosphate, pH, Turb, Spec. Cond
PRESERVATIVE:
Maxxam
Success Through Science

CABIN LABELS

SAMPLE I.D.: NGSTM01
COMPANY NAME: SMVRRS
PROJECT REFERENCE: CBWQM
DATE: Sep 20, 2012
TIME: 10:00am MDT
ANALYSIS: Alk, NO_2/NO_3, Ortho-phosphate
PRESERVATIVE: N/A
Maxxam
Success Through Science

SAMPLE I.D.: NG STM 02
COMPANY NAME: SMVRRS
PROJECT REFERENCE: CBWQM
DATE: Sep 20, 2012
TIME: 12:30pm MDT
ANALYSIS: Alk, NO_2/NO_3, Ortho-phosphate
PRESERVATIVE: N/A
Maxxam
Success Through Science

SAMPLE I.D.: NG STM 03
COMPANY NAME: SMVRRS
PROJECT REFERENCE: CBWQM
DATE: Sep 20, 2012
TIME: 3:00pm MDT
ANALYSIS: Alk, NO_2/NO_3, Ortho-phosphate
PRESERVATIVE: N/A
Maxxam
Success Through Science

SEDIMENT JAR LABEL

SAMPLE I.D.: NG STM 03
COMPANY NAME: SMVRRS
PROJECT REFERENCE: CBWQM
DATE: Sep 20, 2012
TIME: 3:00 pm MDT
ANALYSIS: Metals
PRESERVATIVE: N/A
Maxxam
Success Through Science

Macro-Invertebrate Jar Labels